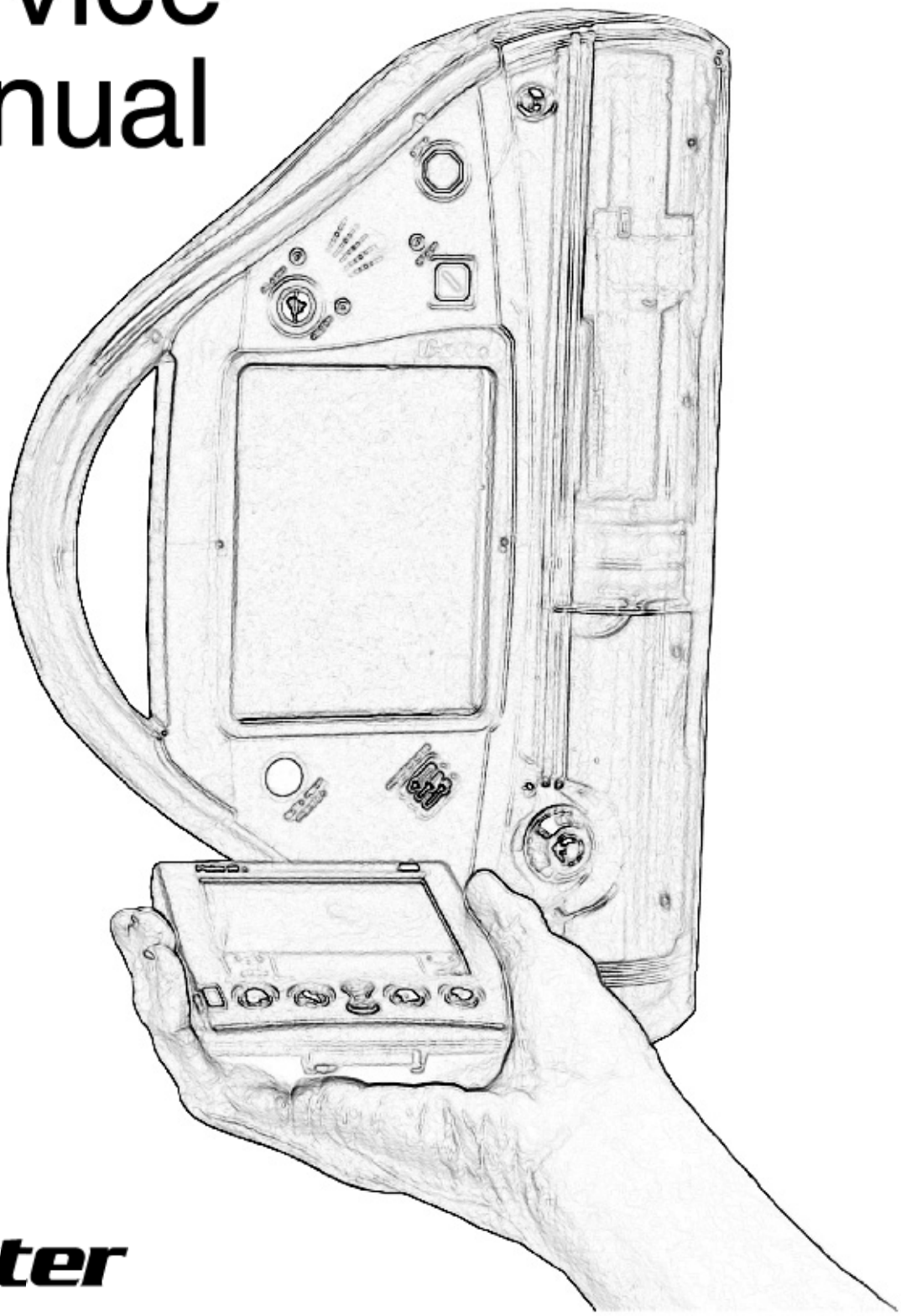
SYNDEO

PCA Syringe Pump

Service Manual



Baxter

Warning

There are risks associated with using anything other than the recommended syringes and sets with this pump. Syringes and sets designated for use with this pump are identified in the "Setting Up the Pump" section of the *Syndeo PCA Syringe Pump User's Guide*. Baxter's warranty on this pump will be null and void and Baxter will assume no responsibility for incidents that may occur if the product is not used in accordance with product labeling. The "Introduction" section of this manual contains a list of general warnings and cautions. Additional warnings and cautions appear where relevant throughout this manual.

Disclaimer

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Year 2000 Compliance

This product is Year 2000 Level C Compliant and will function as designed through 2037 without interruption or failure by the occurrence of dates prior to, during, or after Year 2000.

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Patent Information

This pump is protected under one or more of the following U.S. and Foreign patents: **United States:** D474837, D475454, D479323. **Foreign:** Australia, 151612, 151613, 151697. Other U.S. and Foreign patents pending. Please refer to the pump patent label (located under the battery pack) for more information.

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SYNDEO
PCA Syringe Pump

Service Manual Registration Form

In order to provide up-to-date service information, Baxter's Andover Service Center has instituted a Service Manual Maintenance Program. This program will provide updates, addenda, and service bulletins on a periodic basis to registered users. Participation in this program is recommended for all those who will be using this manual to perform routine maintenance, calibration, and repairs.

To register, you MUST fill in and return this registration form. A separate registration form must be completed for each service manual in your facility.

Service Manual Part Number: 71-07-42-448

NAME: _____

FACILITY: _____

ADDRESS: _____

_____

CITY, STATE, ZIP: _____

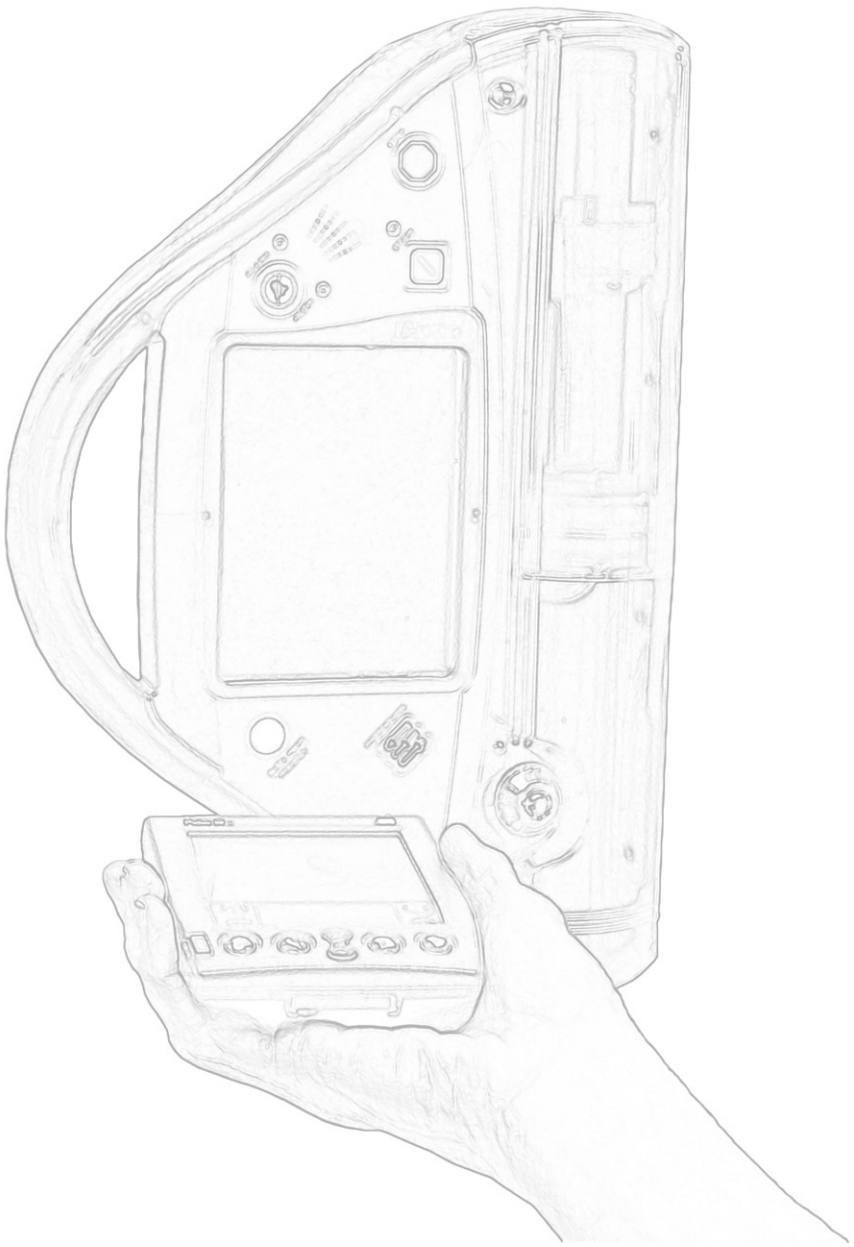
PHONE: _____

E-MAIL ADDRESS: _____

DATE MANUAL RECEIVED: _____

FOR U.S. CUSTOMERS,
RETURN THIS FORM TO: SERVICE MANUAL REGISTRATION
BAXTER HEALTHCARE CORPORATION
ANDOVER SERVICE CENTER
200 BULFINCH DRIVE
ANDOVER, MA 01810

FOR CUSTOMERS OUTSIDE THE U.S., RETURN THIS FORM TO YOUR LOCAL SUBSIDIARY.



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1 - Introduction

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Overview

The **Syndeo** PCA Syringe Pump (Syndeo pump) is designed for the controlled delivery (continuous, intermittent, and continuous plus intermittent) of analgesic, sedative, and anesthetic solutions through clinically acceptable routes of administration including intravenous, subcutaneous, spinal, epidural, and for regional anesthesia applications.

This pump is appropriate for use in hospital or alternate medical site environments, but it is not intended for use in homecare settings. This pump is not indicated for use with blood or blood products.

Scope

This manual provides service and maintenance information for all Syndeo pump product codes. This information is intended for qualified biomedical personnel and Baxter authorized service representatives.

For complete operational and precautionary information, refer to the *Syndeo PCA Syringe Pump User's Guide* (part # 07-19-X6-933). For pump specifications, cleaning instructions, and Infrared (IrDA) Port functions, refer to the *Syndeo PCA Syringe Pump Technical Specifications* (part # 07-19-X6-935). For pump installation and configuration, refer to the *Syndeo PCA Syringe Pump Configuration Guide* (part # 07-19-X8-700).

CAUTION Only trained, qualified personnel should perform procedures in this manual.

CAUTION Except for the procedures and part replacements included in this document, no disassembly or repair of this pump should be attempted.

Manual Layout

This manual is divided into the following sections:

Section 1 (Introduction) provides an overview of the contents of this Service Manual and includes Warnings and Cautions concerning the use and care of this product.

Section 2 (Theory Of Operation) details the functional features of the pump. A general overview of the pump's operation and an overall block diagram of the pump are provided.

Section 3 (Care & Routine Maintenance) includes the routine maintenance and recommended cleaning procedures with recommended cleaning agents. Battery replacement procedures are also included.

Section 4 (Troubleshooting) contains troubleshooting tables and procedures for localizing mechanical or electronic faults. A table of Error Code descriptions is also included.

Section 5 (Service Mode) details the features available to the service technician. This information will assist in the calibration of the pump and the troubleshooting of pump problems.

Section 6 (Pump Calibration & Verification) includes the procedures required to calibrate the pump. A table at the beginning of this section specifies the calibration and verification procedures required after a repair has been performed.

Section 7 (Disassembly & Reassembly) provides disassembly, replacement, and reassembly instructions for the pump. Required tools and test equipment are specified. Adjustment procedures are provided along with the required torques and tolerances. The real time clock's lithium battery replacement instructions are also contained in this section.

Section 8 (Post Repair Checkout Procedure) includes a complete set of tests that should be performed on the pump after repair has occurred.

Section 9 (Electronic Assembly Drawings) contains the assembly drawings for the interconnecting cables and flex circuits used in the pump.

Section 10 (Repair Parts) provides exploded view drawings and parts lists of replaceable parts and assemblies.

Section 11 (Product Updates) will contain major updates and additional information for the pump. This information will be listed by hardware and software revision numbers and/or product serial number.

Safety Summary

General precautions to observe while using the pump are shown below. Standards under which this product is designed, built, and marketed are also included.

- Before operating the pump, carefully read the user's guide to fully understand the pump's functionality and to ensure safe and proper operation. A user's guide is shipped with each pump.
- Although the pump has been designed and manufactured to exacting specifications, it is not intended to replace trained personnel in the supervision of infusion therapy.
- Read and understand this manual before attempting to perform service or maintenance on the pump.
- To ensure that the pump continues to perform within specifications, perform the Routine Maintenance procedures described in Section 3 of this manual when recommended.
- This manual has been developed with consideration to the requirements in the International Standard, IEC 60601-2-24 (1998-02) Medical Electrical Equipment — Part 2-24: Particular Requirements for Safety of Infusion Pumps and Controllers.
- This product is classified by Underwriters Laboratories Inc. with respect to electric shock, fire and mechanical hazards only in accordance with UL2601-1 Medical Electrical Equipment - Part 1: General Requirements for Safety is classified as:
  - Internally powered
  - Type CF applied part
  - IPX1
  - Not suitable for use with flammable anesthetic mixtures with air, oxygen, or nitrous oxide
  - Continuous operation

Factory Service & Assistance

Baxter Healthcare Corporation provides a one-year limited warranty for each Syndeo pump. (See the inside back cover of this manual for warranty details.) If a pump requires warranty service, call Baxter Healthcare Corporation for repair. While under Baxter Warranty, Service Agreement (optional), or Lease Agreement, the pump must not be opened by unauthorized personnel. Unauthorized repair of a pump before the warranty has elapsed voids the warranty.

Technical Assistance, Service, & Repair

For service and repair, use an authorized Baxter service provider. For technical assistance, parts ordering, or service and repair information for this product, call 1-800-THE-PUMP.

If factory service is desired, pumps may be returned to Baxter Healthcare Corporation for repair. Always call for a return material authorization number before shipping any pump to Baxter Healthcare Corporation.

When calling for service, please be prepared to provide code number and serial number of the unit. A brief written description of the problem should be attached to the instrument when it is returned for service.

Shipping costs for all units returned to Baxter shall be paid for by the customer. The unit must be packed in its original container or in another container that will provide adequate protection during shipment. To ensure prompt return, a Baxter authorized service representative must be notified before shipping any unit for repair.

Definitions

Certain items in this manual are highlighted by special messages. The definitions of the various types of message are provided below.

! WARNING ! **Indicates a possible hazard which, if ignored, could result in severe personal injury or death.**

CAUTION Indicates a problem or unsafe practice which, if not avoided, could result in minor or moderate personal injury, or product or property damage.

NOTE: Provides supplemental information to the accompanying text.

HINT: Provides information that may assist with the understanding of a procedure or function of a pump feature.

Warnings

! WARNING ! **This device should be repaired only by trained, qualified personnel using Baxter-recommended parts. There are risks associated with using anything other than Baxter-recommended parts and procedures. Baxter will assume no responsibility for incidents which may occur if the product was not repaired by qualified Baxter employees.**

! WARNING ! **If the pump has been dropped or appears to be damaged, it should be taken out of service and inspected by qualified service personnel.**

! WARNING ! **Make sure the pump is turned ON before loading a syringe in the pump.**

! WARNING ! **To ensure safe and proper operation, read the *Syndeo PCA Syringe Pump User's Guide* and any instructions accompanying disposables or accessories before operating the pump.**

! WARNING ! **When attaching the pump to an IV pole, ensure it has been securely clamped and locked.**

! WARNING ! **This pump should only be used with Baxter accessories specified in the "Setting Up the Pump" section of the *Syndeo PCA Syringe Pump User's Guide*. There are risks associated with using anything other than the recommended accessories with this pump.**

! WARNING ! **As with all medical electronic equipment, care must be exercised to avoid exposing this pump to powerful sources of electromagnetic interference. Using the pump near operating equipment which radiate high energy radio frequencies (such as electrosurgical/cauterizing equipment, two-way radios, or cellular telephones) may cause false alarm condition. If this happens, reposition the pump away from the source of interference.**

Cautions

CAUTION In the U.S., use of this pump is restricted by federal law (USA) to sale or use by, on the order of, or under the supervision of a physician or other licensed health care professional.

CAUTION DO NOT operate this infusion pump in the presence of flammable anesthetics, ether, oxygen-enriched, or explosive atmospheres.

CAUTION DO NOT expose the pump to X-rays, gamma rays, or other ionizing radiation, or to strong electric or magnetic fields.

CAUTION Wipe off spills immediately. DO NOT allow fluid or residue to remain on the pump.

CAUTION Ensure proper maintenance of the pump by following the cleaning schedule and methods described in this manual.

CAUTION Do not clean, disinfect, or sterilize any part of the device by autoclaving, or with ethylene oxide gas. Doing so may damage the device and void the warranty. Only external parts of the device should be disinfected.

CAUTION Refer all service, repair, and calibration to trained, qualified personnel.

CAUTION To reduce the risk of electrical shock, only trained, qualified personnel should disassemble this product.

CAUTION For best performance, routine maintenance procedures must be performed. (Refer to Section 3 of this manual.)

CAUTION Wear a grounding wrist strap when disassembling and reassembling the pump.

CAUTION DO NOT lay the pump face down on any surface which could scratch or damage the keypad, the syringe door, or the display screen.

CAUTION When storing the pump, DO NOT press the pole clamp of one pump against the display screen of the pump behind it.

CAUTION When troubleshooting the pump, do not inject or apply signals of any kind. Damage to the pump or its sub-assemblies could result.

CAUTION Motor and sensor magnets may attract metal debris to motors or circuit boards. To prevent debris from entering the pump mechanism, always maintain a clean work area when performing procedures involving the pump mechanism.

CAUTION To avoid personal injury, ensure that the IV pole is stable and secure. Ensure that the pole is able to support the pump, along with any other devices, without tipping or falling. The pole diameter should be between 0.37 inches and 1.5 inches (0.95 cm and 3.81 cm).

Notes

Baxter requests that parties acquiring this device:

- Promptly report the receipt of this device to the manufacturer.
- Report the pump's purchases, receipt in trade, return after sale, loss, destruction, or retirement.
- If this is an initial purchase from the manufacturer, please return a signed copy of the packing list to the manufacturer. Call 1-800-THE-PUMP (USA) or 1-877-331-9336 (Canada) for additional information.

For information about the Syndeo Pump, refer to the following manuals or call our Product Information Center at 1-800-933-0303.

Manual	Part Number *
Syndeo PCA Syringe Pump User's Guide	07-19-X6-933
Syndeo PCA Syringe Pump Technical Specifications	07-19-X6-935
Syndeo PCA Syringe Pump Configuration Guide	07-19-X8-700
Syndeo PCA Syringe Pump Service Manual	71-07-X2-448
* The "X" in the above part numbers indicates the current revision.	

Labeling Symbol Definitions

IPX1	Enclosed equipment protected against dripping fluids.
	Attention, consult accompanying documents.
	Type CF applied parts in accordance with UL 2601-1.
	Recyclable, dispose of properly.
	This product is classified by Underwriters Laboratories Inc. with respect to electric shock, fire, and mechanical hazards only in accordance with UL 2601-1, CAN/CSA C22.2 No. 601.1, and IEC 60601-2-24.

2 - Theory of Operation

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Overview

This section describes the functional parts of the pump. Of major interest are the sensors used to ensure proper operation of the pump. The drive mechanics are designed to provide long-lasting operation, and the electronics which control the pump are designed for durability.

The interconnecting wiring diagram at the end of this section provides a reference for the connections between the electronic modules inside the pump.

Operational Sensors

Door Sensor

The door sensor is located inside the pump housing near the catch for the door latch. This hall-effect device senses the presence/absence of a magnetic field. A magnet is mounted in the end of the door latch. When the door is closed and locked, the magnetic field created by the magnet is detected by the hall-effect door sensor. When the door is unlocked, the magnetic field no longer activates the sensor.

Refer to Figure 2-1 for an illustration of the location of the following sensors.

Syringe Barrel Detector

The syringe barrel detector is located in the base of the syringe compartment. When the pump is turned ON and a syringe is installed in the pump, the syringe barrel activates the sensor switch. This sensor works in conjuction with the syringe flange detector and the thumb press sensor to identify when a syringe is properly loaded into the pump and when the pusher block is properly positioned against the syringe plunger.

Syringe Flange Detector

The syringe flange detector is also located in the base of the syringe compartment. The flange detector bar rests in a slot in the housing. When the pump is turned ON and a syringe is installed in the pump, the syringe flange is positioned in this slot, activating the sensor switch. This sensor works in conjuction with the syringe barrel detector and the thumb press sensor to identify when a syringe is properly loaded into the pump and when the pusher block is properly positioned against the syringe plunger.

Syringe Diameter Sensor

The syringe diameter sensor is located inside the pump housing near the barrel clamp assembly. When a syringe is loaded into the pump, the position of the barrel clamp is determined by the size of the syringe. Inside the pump, a magnet is attached to the barrel clamp assembly. The position of this magnet depends on the size of the syringe barrel. The sensor monitors the magnetic field created by the magnet. The proximity of the magnet to the sensor determines the magnetic field strength which is then used by the electronics to determine the syringe size.

Thumb Press Sensor

The thumb press sensor is located in the pusher block (plunger driver). When the pusher block is positioned against the syringe thumb press (plunger), the thumb press pin in the center of the extended load beam is compressed which activates the sensor switch. This sensor works in conjuction with the syringe barrel detector and the syringe flange detector to identify when a syringe is properly loaded into the pump and when the pusher block is properly positioned against the syringe plunger.

Occlusion Sensor

The occlusion sensor is located in the face of the pusher block in conjunction with the thumb press sensor. During normal prescription administration, the pusher block presses on the syringe plunger forcing fluid from the syringe to the patient. If a blockage occurs which prohibits proper fluid flow, pressure builds up within the syringe which results in an increase in force between the pusher block and the syringe plunger (thumb press). This force is transmitted through the extended end of the load beam to a force sensor in the pusher block. When the pressure against the occlusion sensor reaches a predetermined limit (refer to the *Syndeo PCA Syringe Pump Technical Specifications*), the pump will alarm and stop pumping fluid.

Linear Position Sensors

The linear position sensor actually consists of a series of eight sensors. These sensors are located inside the pump's housing and require pump disassembly to access. During an infusion, a magnet located within the pusher block assembly creates a magnetic field. As the pusher block moves forward, these sensors monitor the changing magnetic field as an indication of this movement. This in turn helps to ensure that proper fluid delivery is maintained.

Rotary Nut Sensor

The rotary nut sensor is a switch located within the drive mechanism slide assembly, inside the pump's housing. When the pusher block release lever is fully squeezed, the rotary nut is disengaged from the drive screw. When the lever is released, the rotary nut re-engages the drive screw. This sensor switch indicates the engaged or disengaged condition of the rotary nut and drive screw.

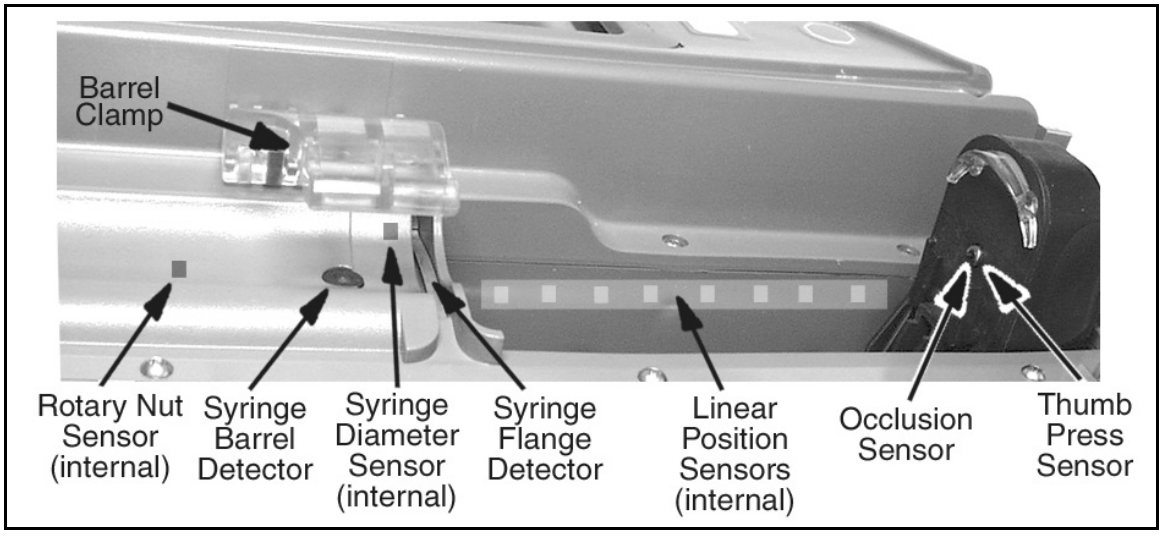

Figure 2-1. Sensor Locations

Mechanical Assemblies

Drive Mechanism Assembly

Refer to Figure 2-2. The drive mechanism assembly is held between the two pump case housings. The majority of the mechanism is contained within the pump housing. The only parts visible outside the pump housing are the pusher block assembly and the outer tube.

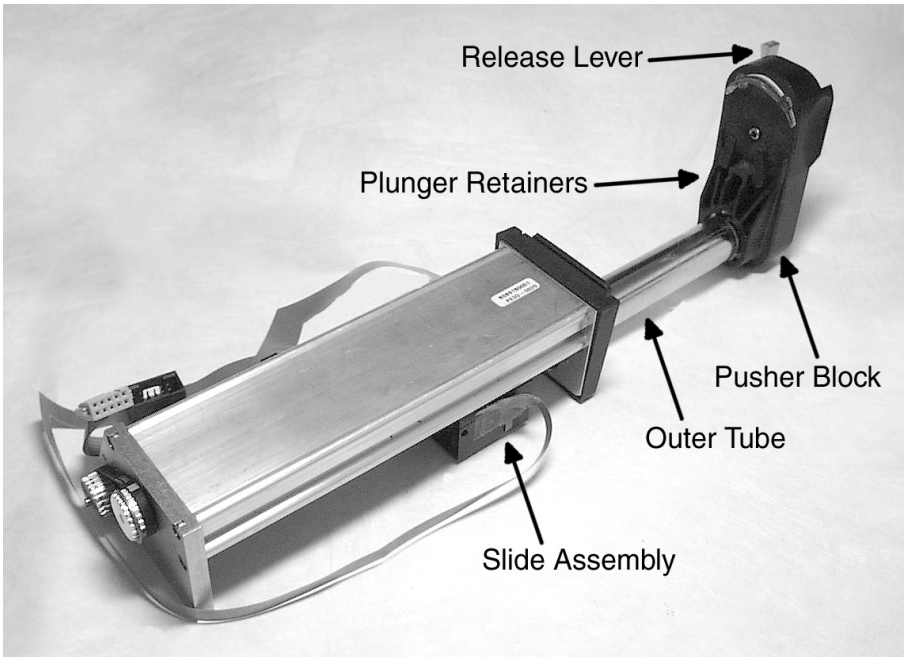

Figure 2-2. Drive Mechanism Assembly

Drive Mechanism Operation

Refer to Figure 2-3. A DC drive motor with an integral gearbox is connected to the drive screw by a pair of sprocket gears and a drive belt linking them together. The slide assembly is connected to the pusher block by the outer tube. The slide assembly contains a rotary nut and a rotary nut sensor switch. The rotary nut is normally engaged around the drive screw.

An electronic motor drive circuit causes the motor and the drive screw to turn. As the rotary nut travels along the drive screw, the pusher block presses against the syringe plunger forcing fluid out of the syringe. The prescription parameters programmed into the pump by the clinician determine the speed of the motor and therefore the rate of fluid delivery.

The pusher block release lever performs two functions:

- Squeezing the lever opens the two plunger retainers. When the pusher block is pressed against the syringe plunger, releasing the lever mechanically engages the two plunger retainers around the plunger.
- Squeezing the lever also releases the rotary nut from the drive screw and allows the pusher block assembly to move freely. Releasing the lever mechanically engages the rotary nut with the drive screw.

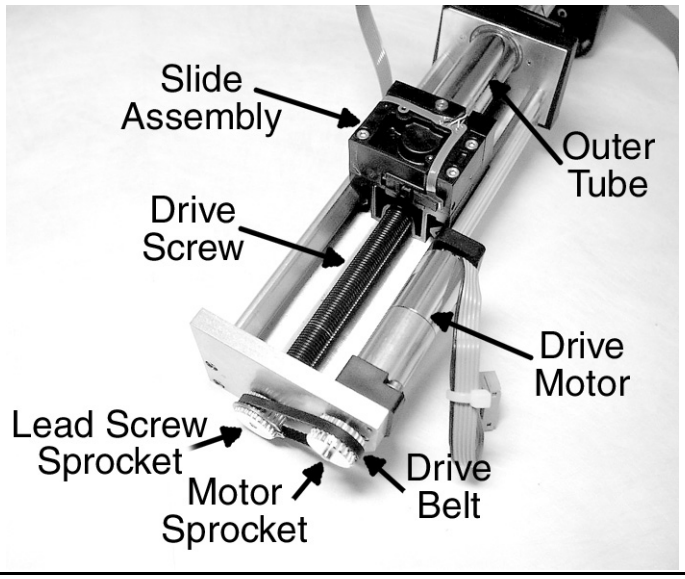

Figure 2-3. Internal Drive Mechanism Parts

Barrel Clamp Assembly

Refer to Figure 2-4. The barrel clamp assembly, in conjunction with the flange slot, holds the syringe in place. The pump is designed to work with the Baxter Prefilled 50 cc, B-D 60 cc, or MONOjECT 60 cc syringes. Use of other syringes may result in incorrect delivery rates.

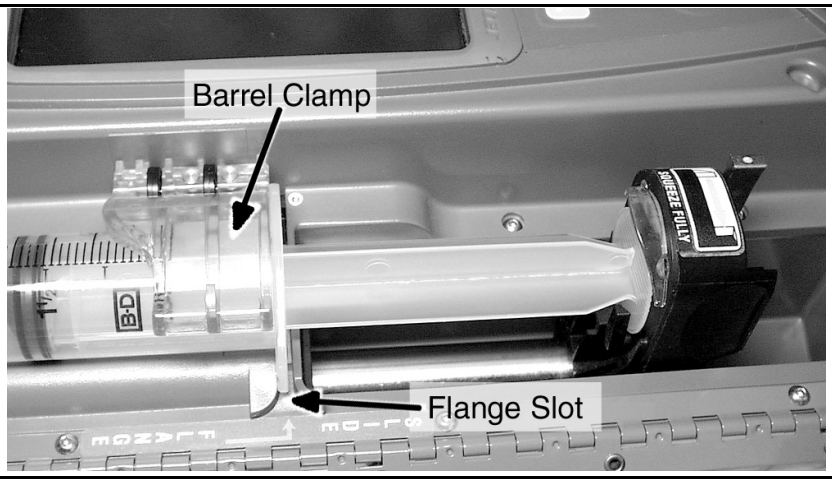

Figure 2-4. Barrel Clamp and Flange Slot

Electronic Circuit Boards

Circuit Board Stack

Refer to Figure 2-5. The circuit board stack consists of the interface board, the global brain board, the liquid crystal display (LCD), and the touchscreen.

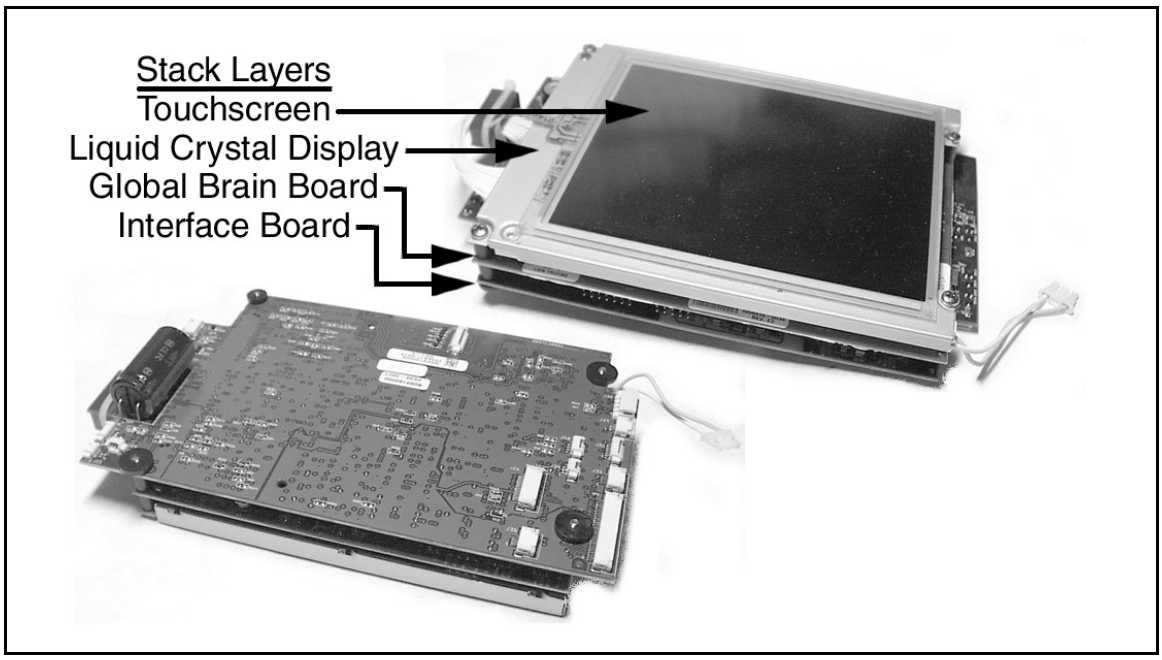

Figure 2-5. Circuit Board Stack Assembly

Interface Board

The interface board connects the input devices (sensors, switches, touchscreen, etc.) and the output devices (motor, lights, LCD, etc.) to the global brain board through the 200-pin connector.

Global Brain Board

The global brain board uses a dual-processor (Master-Safety) architecture approach for safety mitigation. The master processor is ARM7 based with a clock speed of 74 MHz. Program and data storage is provided by on-board FLASH, SRAM, and EEPROM memory. The master processor controls a number of peripheral circuits which operate the mechanical and electronic elements in the pump. The safety processor is a RISC device with embedded FLASH, SRAM, and EEPROM for program and data storage. The safety processor is responsible for monitoring critical system functions to ensure a fail-safe operating mode. The two processors communicate through a dedicated UART channel.

NOTE: All memory devices are located on the global brain board. If this circuit board is replaced, all pump settings, including the serial number, must be re-entered. The pump must be considered as a newly received device and reference should be made to the *Syndeo PCA Syringe Pump Configuration Guide* for the procedures needed to set up the pump.

The global brain board uses an A to D converter to evaluate the various sensor inputs. A touchscreen controller evaluates the position of a touch on the display. Additional

controller circuits switch the LCD backlight and the drive motor on and off for power management.

A lithium battery (type - CR1632) is located on the global brain board. Its sole purpose is to maintain voltage to the real time clock circuit when the pump is OFF. This battery has a life of several years and should only require replacement if the pump fails to keep proper time. This battery may need replacement if the initial start-up display continually shows the wrong date and time when the pump is turned ON. To replace this battery, the circuit board stack must be removed from the pump and disassembled.

Liquid Crystal Display (LCD)

The LCD is an RGB transmissive color display with a 320 x 240 dots per inch (dpi) format. A replaceable backlight is used to either hide (light off) or show (light on) the information on the display screen. The LCD provides pump operational parameters and permits the entry of information by touching a touchscreen overlay.

Touchscreen

The touchscreen is affixed to the front of the liquid crystal display (LCD). The touchscreen and the LCD are available as an assembly, but may also be purchased separately. A special alignment fixture is required to replace a touchscreen on an LCD. (Refer to the Baxter-Created Fixtures List in Section 7 of this manual.)

IrDA Board

The infrared (IrDA) board is used for communication between the pump and a personal data assistant (PDA) or a portable printer with IrDA capabilities.

Backlight Inverter Board

This board provides control of the backlight attached to the liquid crystal display. The backlight turns off after one minute of inactivity on the touchscreen. When the backlight is off, pressing the touchscreen will turn the backlight on.

! WARNING ! **Voltage at connector J1 on the backlight inverter board is 200 to 600 VAC. Applying power to the pump while it is disassembled could create a shock hazard.**

System Interconnect Wiring Diagram

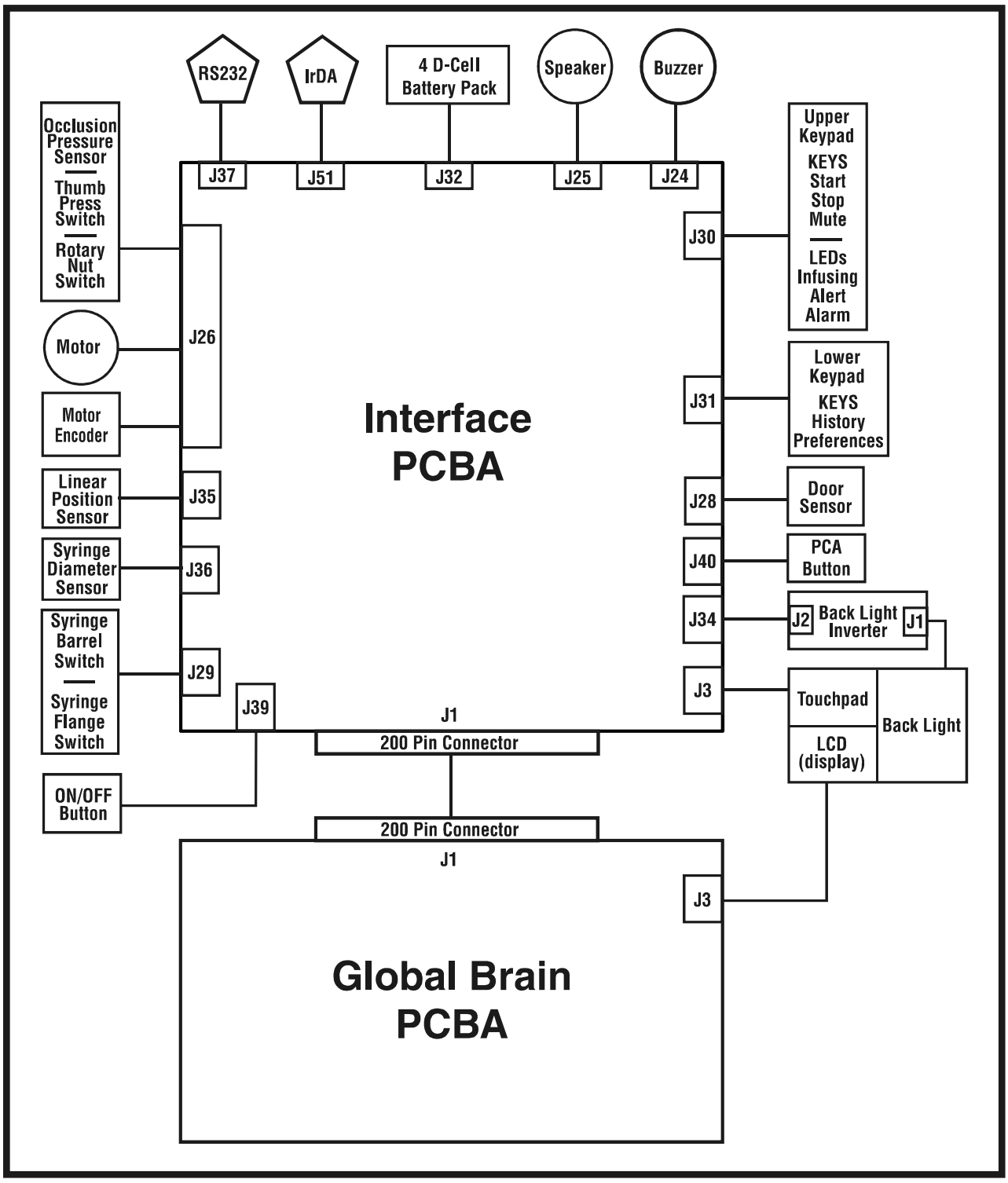

Figure 2-6. System Interconnect Wiring Diagram

3 - Care & Routine Maintenance

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Installing New D-Cell Batteries 3-4
Pump Storage 3-5

Overview

This section contains routine maintenance procedures for the pump. If an abnormal condition occurs while performing these procedures, remove the pump from service and contact trained, qualified personnel.

The pump is designed to provide reliable service with only minor routine maintenance. A Functional Check-Out Procedure found in the *Syndeo PCA Syringe Pump Configuration Guide* should be conducted at least once every twelve months to ensure proper operation. The pump should be cleaned and disinfected, according to frequency of use and hospital protocol.

Cleaning & Disinfecting

Cleaning the Exterior

Clean the pump after each use. Clean the exterior with a soft cloth, sparingly dampened with one of the cleaning solutions listed in Table 3-1. For concentrated cleaners, follow the manufacturer's dilution instructions. To clean pumps that have been in an Isolation Area, select those agents from Table 3-1 that both clean and disinfect.

For complete cleaning and disinfecting information, refer to the *Recommended Cleaning Products* sheet which accompanied the pump when purchased.

Baxter Healthcare Corporation recommends the use of the following cleaning products with the Syndeo Pump:

Product	Cleaner	Disinfectant
Mild detergent and water	X	
5% to 10% bleach and water	X	X
Super Sani-Cloth Germicidal Disposable Wipe (Professional Disposables, Inc.)	X	X
Manu-Klenz (STERIS Corporation)	X	
LpH se (STERIS Corporation)	X	X
Vesphene IIse (STERIS Corporation)	X	X
TOR II (Huntington Professional Products)	X	X
Hi-TOR Plus (Huntington Professional Products)	X	X

Table 3-1. Recommended Cleaning Products

CAUTION The pump is not liquid proof and must not be immersed in liquid. Avoid getting liquids inside the pump or permanent damage to the pump may result.

CAUTION DO NOT use hard or abrasive instruments for cleaning.

CAUTION DO NOT use alcohol for cleaning or sterilizing. Sterilization by ETO, steam, etc., should not be attempted.

CAUTION DO NOT use the following chemicals on the pump, as they will damage the front panel: acetone, acetoaldehyde, ammonia, benzene, hydroxytoluene, methylene chloride, and ozone. DO NOT use cleaners containing n-alkyl dimethyl ethyl benzyl ammonium chloride unless they are listed in the above recommended cleaning products.

CAUTION DO NOT clean, disinfect, or sterilize any part of the pump by autoclaving or with ethylene oxide gas. Doing so may damage the pump and void the warranty. Only external parts of the pump should be disinfected.

As brand names and companies sometimes change, call the Product Information Center (1-800-933-0303) for the current list of recommended cleaners or if you have any questions regarding the appropriate cleaners to use with this pump.

Recommendation of the cleaning agents is based on their compatibility with the materials with which the pump is constructed. No representation is intended as to the effectiveness of any cleaning agent. Always follow the manufacturer’s dilution instructions for concentrated cleaners.

Routine Maintenance

Table 3-2 is a routine maintenance schedule for the pump. Perform the checks at the intervals shown.

CAUTION If any evidence of damage is found, repair as necessary or contact your authorized service provider.

Check	Action
Perform as required but recommended after each use	
Housings	Clean housing and front panel as recommended in the cleaning instructions. Check for cracks or large dents.
Labels	Clean as recommended in the cleaning instructions. Check for scratches, cuts, obliterated words, or missing labels. Replace as necessary.
External connectors	Verify that there are no loose or missing parts, including caps/covers and retainers, and that any attached accessories are free of damage.
PCA button	Perform a visual inspection of the PCA button and cable. If the material around the button contains breaks or tears, or the cable is frayed or cut, remove the PCA button from further use.
Mounting clamp knob and mechanism	Verify that the knob operates freely throughout its range of motion. Make sure that pads are present, and that the mounting clamp operates properly from stop to stop.
Main batteries	Check the battery status icon in the upper right corner of the display. Replace the D-Cell batteries as needed.
Perform as required but recommended once every 12 months	
Entire pump	Perform the Functional Check-out Procedure described in the *Syndeo PCA Syringe Pump Configuration Guide*. Use a copy of the Functional Checkout Data Sheet included in the guide to record the results and the PASS/FAIL conditions for the pump.
Outer Tube	Extend the pusher block to the top of its travel, then use a small swab to apply a very light coating of silicone grease to the surface of the long metal tube connected to the pusher block. Wipe off any excess. No pump disassembly is required.
Barrel Clamp Assembly	Raise the barrel clamp by hand, then use a small swab to apply a very light coating of silicone grease to the surface of the two metal guide rods. Wipe off any excess. No pump disassembly is required.
Pole Clamp Shaft	Rotate the knob clockwise until the shaft is fully extended into the pole clamp, then use a small swab to apply a very light coating of silicone grease to the threads. Wipe off any excess. No pump disassembly is needed.
Perform as required but recommended once every 60 months	
Sensor Calibration Verification	Perform the sensor verification procedures provided in Section 6 of this manual.

Table 3-2. Routine Maintenance Schedule

Lubrication

With the exception of the recommendations listed in Table 3-12, there are no requirements for periodic lubrication of any parts in this pump.

Battery Maintenance

D-Cell Battery Pack

A removable battery pack is located in the rear of the pump. Once removed from the pump, this battery pack must be opened to install or replace the four D-cell alkaline batteries contained inside. Additional battery packs (without batteries) can be ordered as Baxter part # B089120015.

Installing New D-Cell Batteries

CAUTION The D-cell Battery Pack is fairly heavy when the four replaceable alkaline batteries are installed. Be careful not to drop the battery pack.

1. Locate the D-Cell Battery Pack in the rear of the pump. Press the release button, and carefully slide the battery pack straight out of the pump. Use both hands (one to steady the pack) when removing the battery pack.
2. Refer to the instruction label on the underside of the battery pack, and turn the knob counterclockwise to remove the battery pack cover.

NOTE: When installing or replacing batteries, always insert four new batteries. Always use Duracell (MN1300) or Duracell ProCell (PC1300) D-Cell alkaline batteries having a date code greater than six years from the date of initial installation. (For example, batteries installed in 2004 should have a "use by" date of at least 2010.) The use of other alkaline battery brands may adversely affect the pump's battery life. Dispose of used alkaline batteries in accordance with local regulations.

3. Refer to Figure 3-1. Insert four D-cell alkaline batteries with their polarity as shown on the instruction labels inside the battery pack.

CAUTION Installing batteries with incorrect polarity may lead to battery leakage and cause a hazardous condition.

CAUTION To ensure proper pump operation, make sure the batteries fully contact the battery holder terminals. If the terminals appear dirty, use a pencil eraser to clean them.

4. Replace the battery pack cover and turn the knob clockwise to tighten.
5. Slide the battery pack straight into the pump and ensure it latches (clicks) into place.

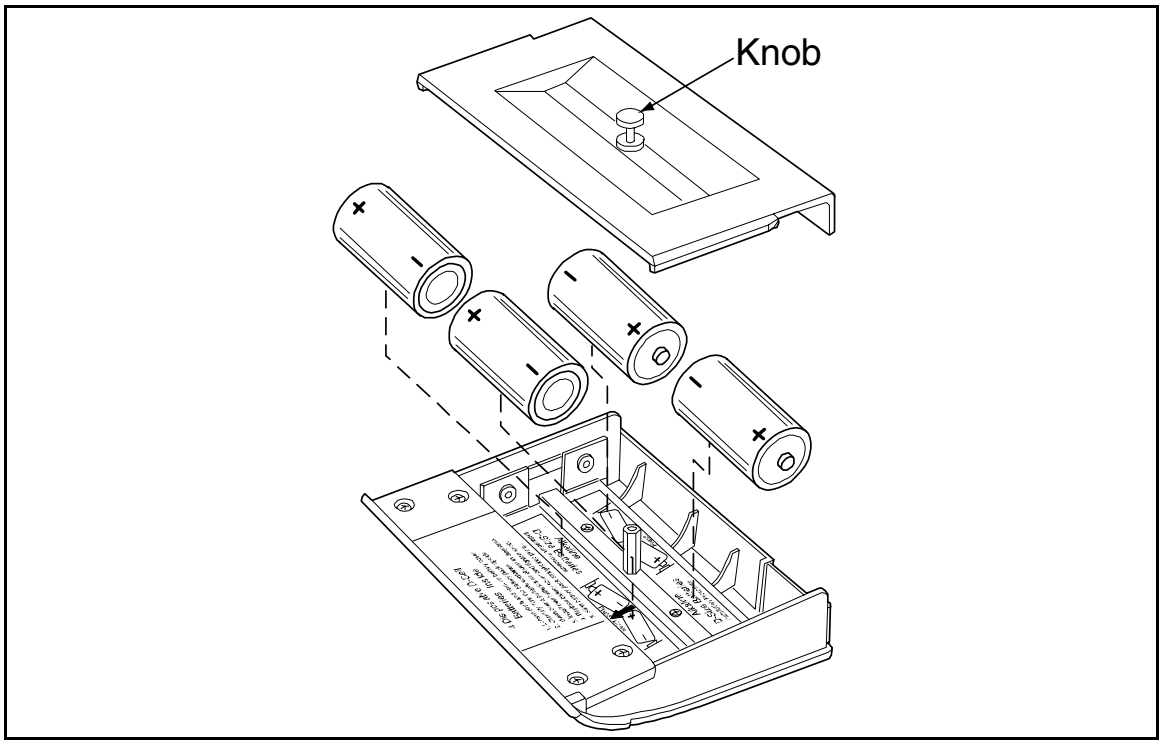


Figure 3-1. Battery Polarity

Pump Storage

The pump should be stored resting on the pole clamp with the handle pointing upward or attached to a pole to avoid accidental damage to the display touchscreen. For storage conditions falling outside the environmental operating limits, Baxter recommends that the pump be repackaged in the original shipping materials.

! WARNING ! **Remove the batteries prior to storing the pump for more than 30 days or if the storage conditions are outside of the battery manufacturer's specifications.**

CAUTION Do not store the pump with the battery pack installed and the pump turned ON.

CAUTION After storage, the pump must reach operating temperature range before operating the pump.

Ensure that the unpackaged pump is stored in a clean and dry environment with air quality equivalent to or better than normal warehouse air.

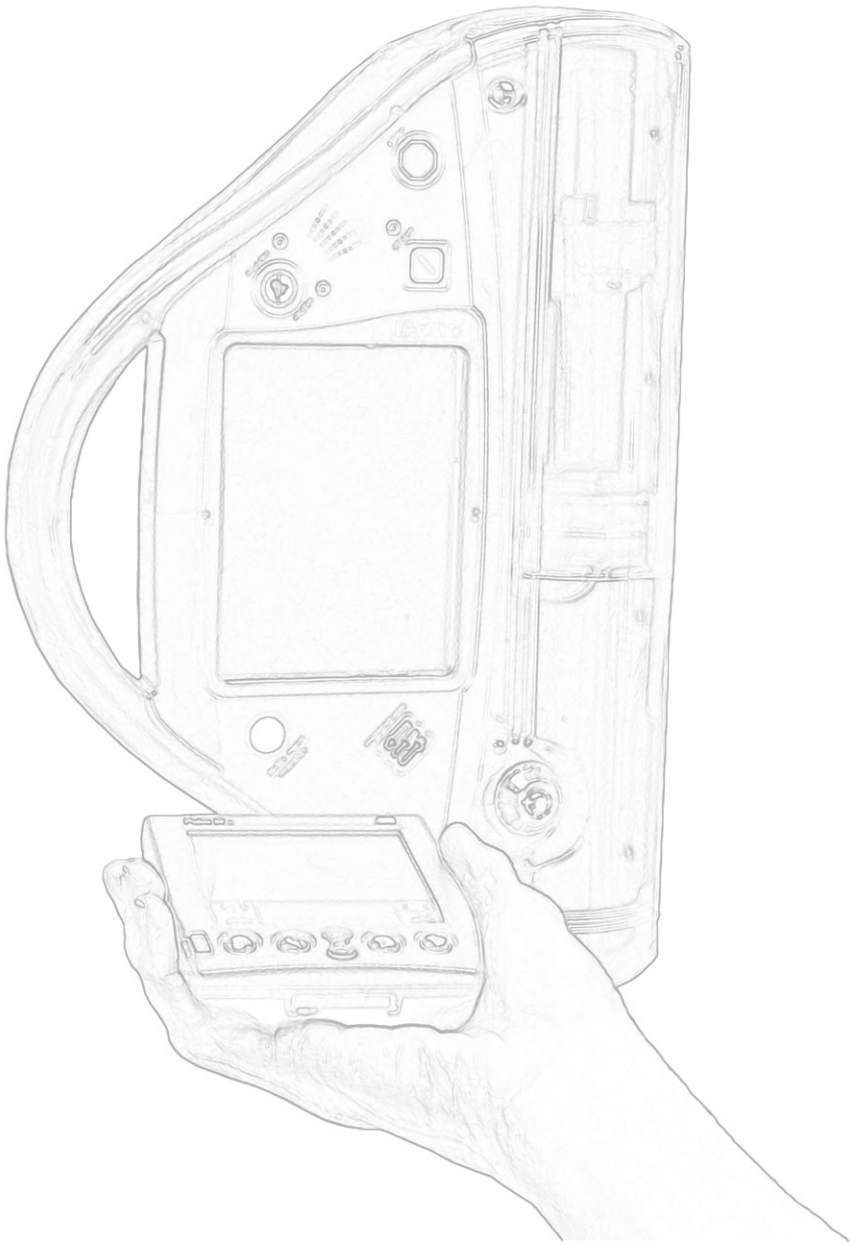
Pump Storage Requirements

- Temperature: -22° F to 140° F (-30° C to 60° C)
- Relative Humidity: 10-95% (non-condensing)
- Barometric Pressure: 500 hPa to 1060 hPa (0.493 atm to 1.045 atm)

Store batteries in a clean, dry environment.

Battery Storage Requirements

- Temperature: 50º F to 77º F (10º C to 25º C)
- Relative Humidity: not to exceed 65% (non-condensing)



4 - Troubleshooting

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Overview

Pumps under warranty must be returned to the factory for troubleshooting and repair. Unauthorized disassembly/repair of the pump will void the warranty. If a pump is malfunctioning, check the following conditions to restore pump operation:

- Ensure that the batteries are properly installed (correct polarity) and not depleted.
- Ensure that the patient control button is properly installed.
- Ensure that the syringe is properly installed and the pusher block is properly engaged on the syringe.

This section contains tables showing alert messages, alarm messages, and service code messages, and recommends possible corrective actions needed to put the pump back into proper operation.

Use the information in Section 7 of this manual when disassembly and reassembly of the pump is required.

After the pump is repaired, refer to Section 6 and perform the required pump calibration and verification procedures followed by the Post Repair Checkout Procedures provided in Section 8.

User-Induced Conditions

Before you begin troubleshooting, verify that the reported problem is in fact a pump failure and not a user-induced condition. User-induced conditions occur if a user performs an action of misuse which is detected by the pump, causing an alarm or failure. During troubleshooting, the condition can be re-created by repeating the user's actions.

Review the pump's event history to determine the actions the user performed at the time of the reported malfunction.

The pump may stop storing event data immediately after a failure code occurs. Event data storage resumes after failure code recovery.

Device History

Pump events (i.e., "Infusion Started", "Clinician Bolus 125 mg") are stored in the pump's device history log. A maximum of 1000 events will be stored in memory. When subsequent events occur, the first ones stored will be lost.

CAUTION To allow entry into the Advanced Setup Mode to view the Device History, the pump must delete the current patient history stored in memory. If the current patient history is important information to save, use the Infrared Port and either a PDA to save or a printer to print the patient history prior to entering the Advanced Setup Mode.

The device history log can be used as a troubleshooting tool by those persons authorized to access the pump's Advanced Setup features. To view the device history:

1. Press and hold the PREFERENCES button, then press the Power ON/OFF button to turn the pump ON. Continue to press the PREFERENCES button until a Security Screen appears. To access the Advanced Setup Mode, enter the four-digit Advanced Setup Security Code (Default=5734) and press ENTER.
2. Use the SCROLL UP and SCROLL DOWN keys to highlight "View Device Log", then press the ENTER key.
3. Use the PAGE UP and PAGE DOWN keys to scroll through the information as needed. The screen displays the summary of pump events, starting with the most recently stored event.
4. To exit the Advanced Setup Mode, press the Power ON/OFF button to turn the pump OFF.

Troubleshooting

The troubleshooting information contained in this section is written for the modular replacement level for electronic circuit boards and assemblies. Mechanical assemblies are repairable to either the subassembly or individual parts basis. Refer to Section 7 of this manual for disassembly and reassembly procedures.

NOTE: All memory devices are located on the global brain board. If this circuit board is replaced, all pump settings, including the Serial Number, must be re-entered. The pump must be considered as a newly received device and reference should be made to the *Syndeo PCA Syringe Pump Configuration Guide* for the procedures needed to set up the pump.

Connectors and wiring are the most likely electrical failure points. To troubleshoot these assemblies it is best to have the flex circuits or wire harnesses connected and check at the adjoining pins or solder pads on the printed circuit board. If connection is intermittent, replace the flex circuit or wiring harness creating the problem. Do not attempt to repair it. Refer to Section 9 of this manual for diagrams of all wiring harnesses and flex circuits.

Do not attempt to repair circuit boards. The circuit boards are multi-layer and contain surface mounted components that are not intended to be repaired in the field.

Refer to Section 10 for lists and exploded view drawings of those parts available for pump repair.

The service mode can be used to quickly check the pump operating conditions. Refer to Section 5 for details about the service mode features.

! WARNING ! **Voltage at connector J1 on the backlight inverter board is 200 to 600 VAC. Applying power to the pump while it is disassembled could create a shock hazard.**

CAUTION When troubleshooting the pump, do not inject or apply signals of any type. Damage to the pump or its sub-assemblies could result.

If you are unable to troubleshoot and repair the problem using the information in this manual, contact your local Baxter Service Center for technical assistance. Call 1-800-THE-PUMP (USA) or 1-877-331-9336 (Canada) for additional information.

Power-ON & Display Problems

The corrective actions provided in Table 4-1 below are listed in the order of typical fault.

Description	Corrective Action
Pump does not turn ON	• Replace the battery pack or batteries. (If the alarm light is flashing and the speaker is chirping, refer to "Software Update" in Section 5.) • Replace the power board harness. • Replace the Power ON/OFF switch membrane. • Replace the interface board. • Replace the global brain board.
Display is black	• Check/replace the backlight inverter harness between the interface board and the backlight inverter board. • Replace the backlight. • Replace the backlight inverter board. • Replace the interface board.
Display is intermittent	• Check/replace the backlight inverter harness between the interface board and the backlight inverter board. • Replace the backlight inverter board. • Replace the backlight. • Replace the interface board.
Display is too dark	• Press the **PREFERENCES** button and adjust the **BRIGHTNESS** setting. • Replace the backlight harness. • Replace the backlight inverter board. • Replace the backlight. • Replace the interface board. • Replace the global brain board.
Images or text on the display are too blurry or not readable	• Press the **PREFERENCES** button and adjust the **CONTRAST** setting. • Check the LCD display harness connection between the global brain board and the LCD. • Replace the interface board. • Replace the global brain board.

Table 4-1.

Description	Corrective Action
Waves or ripples are observed on the display	• Press the **PREFERENCES** button and adjust the **BRIGHTNESS** or **CONTRAST** setting. • Replace the backlight harness. • Replace the backlight inverter board. • Replace the backlight.
Vertical or horizontal lines are seen on the display	• Check the LCD display harness connection between the global brain board and the LCD. • Replace the display harness. • Replace the LCD.
Images or text missing on the display	• Check the LCD display harness connection between the global brain board and the LCD. • Replace the display harness. • Replace the LCD. • Replace the global brain board.
Touchscreen is not responsive	• Check the touchscreen connection (J3) on the interface board. • Replace the touchscreen. • Replace the interface board.
Black spots, missing pixels or uniform color on the display	• Check the LCD display harness connection between the global brain board and the LCD. • Replace the display harness. • Replace the LCD.

Table 4-1.

Other Problems

The corrective actions provided in Table 4-2 below are listed in the order of typical fault.

Problem	Corrective Action
Buzzer sounding and red LED flashing - display is off	Turn the pump OFF and back ON. If the problem does not go away, replace the batteries. If the problem still occurs, replace the global brain board. NOTE: These symptoms can be caused by the accidental placement of the pump into the software update mode. To check this possibility, refer to the Service Mode "Software Update" feature in Section 5.
Pump does not communicate with the peripheral IrDA device	First, ensure the peripheral device is functional by testing it with another pump. If the pump is the cause of the problem: • Check the connections between the interface board and the IrDA board J51. • Replace the IrDA board. • Replace the interface board. • Replace the global brain board.

Table 4-2. Other Problems

Final Checkout

After repair is completed, perform any required calibration procedures shown in Section 6, then verify proper pump operation by performing the Post Repair Checkout Procedure in Section 8 of this manual.

Alert, Alarm, & Service Code Message Displays

When an alert, alarm, or service code condition occurs, the front panel display will provide a message describing the cause.

Service codes have priority over alarms and alerts. Alarms have priority over alerts. If two events occur simultaneously, the highest priority message is displayed and the highest priority alarm tone sounds.

All alarms, alerts, and service codes that occur during pump operation are stored in the device history log so they can be used as a troubleshooting aid.

Alerts

The alerts in Table 4-3 are listed in alphabetical order. Similar lists are contained in the pump user's guide. While the actions suggested in the user's guide are for the clinicians, the actions suggested in the following table are for the benefit of biomedical and clinical engineering personnel.

When an alert occurs:

- An infusion, if in progress, continues.
- An audible alert sounds and the yellow light flashes.
- The display screen tells the nature of the alert and what to do.
- Pressing the MUTE button silences the audible alert for approximately 15 minutes.
- Pressing the OKAY key silences the audible alert for approximately 15 minutes and displays a yellow bell at the top of the display screen.
- Pressing the yellow bell displays the alert message and restarts the audible alert.
- Clearing the alert condition silences the audible alert and stops the yellow light from flashing.

NOTE: When an alert occurs while in "Preferences" or "Patient History", press BACK to exit the current screen and view the alert text.

Alert	Situation	Corrective Action
Batteries Low	Approximately 60, 45, 30, or 15 minutes of battery life remain. (see screen for time)	Turn the pump OFF and replace all four D-cell alkaline batteries.
(Button Name) Button Held	The button has been continuously pressed for more than three minutes.	Release the button. If the button remains stuck, pump repair is required.
Call Back Alert	This alert occurs after approximately two minutes of inactivity if the pump is NOT infusing, NOT in standby and not in service mode.	To proceed, acknowledge the alert and enter the clinician security code.
Cover Open Alert	The syringe is loaded and confirmed, but the syringe compartment door has been left unlocked for more than 60 seconds.	Close and lock the syringe compartment door.

Table 4-3. Alert Conditions

Alert	Situation	Corrective Action
Dosage Limit Alert	The predetermined PCA dose limit (either one hour or four hour) has been reached.	• The pump will automatically clear the alert and permit further PCA dose delivery when the next one-hour or four-hour time period begins. • Per physician's orders, modify the prescription.
PCA Button Disconnected	The pump senses that the PCA cable has been disconnected.	Connect the PCA cable to the pump or, if this does not fix the problem, replace the PCA cable.
PCA Button Held	The PCA button has been continuously pressed for more than three minutes.	• Release the PCA button. • Replace the PCA cable. • If the indication is that the PCA button remains stuck, replace the interface board or the global brain board.
Screen Held	Something is touching the display screen and has for more than three minutes.	• Remove the contact from the display screen. • If the display screen remains stuck, replace the touchscreen, interface board, or global brain board.
Syringe Volume Low	The volume remaining is less than 5 mL.	Prepare to change the syringe, if prescribed.
Unauthorized Access Attempt	An incorrect password has been entered three times.	Unlock, then lock the syringe door.

Table 4-3. Alert Conditions

Alarms

The alarms in Table 4-4 are listed in alphabetical order. Similar lists are contained in the pump user's guide. While the actions suggested in the user's guide are for the clinicians, the actions suggested in the following table are for the benefit of biomedical and clinical engineering personnel.

When an alarm occurs:

- The pump stops infusing.
- An audible alarm sounds and the red light flashes.
- The display screen tells you the nature of the alarm and what you must do.
- Pressing the MUTE button (except for a "Batteries Depleted" Alarm) silences the audible alarm for two minutes. After two minutes, the audible alarm resumes.
- Clearing the alarm condition silences the audible alarm and stops the red light from flashing.

NOTE: Alarms are disabled under the following conditions:
a) There is no occlusion alarm if the pump is not infusing.
b) There is no “Cover Unlocked During Operation” alarm if the pump is not infusing or priming.

Alarm	Situation	Corrective Action
Batteries Depleted	Approximately three minutes of battery power remain to power the pump. The user will not be able to silence the “Batteries Depleted” alarm without replacing the batteries in the battery pack.	Turn the pump OFF and replace all four D-cell alkaline batteries.
(Button Name) Button Stuck	The button has been continuously pressed for more than six minutes.	• Release the button, then press OK to resume normal operation. • Release the button. If the indication is that the button remains stuck, replace the interface board or the global brain board.
Cover Unlocked	The syringe compartment door is unlocked while the pump is infusing.	• Close and lock the syringe compartment door. • Replace the interface board. • Replace the global brain board.
Downstream Occlusion	The pump has detected an occlusion or blockage that is preventing fluid flow.	• Check the tubing set for kinks, closed clamps or clogged filter. • Check for an empty syringe. • Have the clinician assess the patency of the vascular device. • Replace the drive mechanism, interface board, or global brain board.
(Sensor Name) Not Calibrated	The calibration of the specified sensor is either invalid or corrupted.	Recalibrate that pump sensor.
Syringe Empty	The syringe is empty.	Replace the syringe, if prescribed.
Syringe Misloaded	The syringe is misloaded, or it has moved out of place while priming or infusing.	Properly load the syringe. If an alarm recurs, pump calibration or pump repair is required.
Touchscreen Not Calibrated	The display screen calibration is invalid or corrupted.	Refer to the *Touchscreen Calibration* process to recalibrate the touchscreen.
Touchscreen Held	Something has been continuously touching the display screen for more than six minutes.	• Remove the contact from the display screen. • If the display screen remains stuck, replace the touchscreen, interface board, or global brain board.

Table 4-4. Alarm Conditions

Service Codes

If a service code occurs, turn the pump OFF to silence the alarm, then turn the pump back ON and reprogram the infusion. If the service code occurs again, write down the complete code number and attach it to the pump, turn the pump OFF, and then contact authorized service personnel.

When a service code occurs:

- the pump stops infusing
- an alarm sounds
- the screen displays a service code number

An example of a service code number is:

961:310:850:75

The first three digits (961) specify the cause of the service code. If the service code contains additional numbers, as in the example, they can be used by software engineers to further evaluate the cause of the problem.

Table 4-5 provides a listing of the Service Code Ranges. Table 4-6 contains a listing of pump service codes and the recommended corrective action for each condition. If your pump displays a service code not listed, record the service code number and contact your local service center for technical assistance. For additional information call 1-800-THE-PUMP (USA) or 1-877-331-9336 (Canada).

Service Code Ranges	Description
0 to 99	Internal software failures detected by the master software.
100 to 199	Hardware diagnostic failures on the global brain board detected by the master software.
200 to 299	Hardware diagnostic failures on the interface board detected by the master software.
300 to 349	Backlight Inverter related failures.
350 to 399	Reserved for future use.
400 to 449	D-cell battery pack related failures.
450 to 499	Sensor related failures detected by the master software.
500 to 599	Data corruption failure detected by the master software.
600 to 699	Hardware diagnostic failures detected by the safety software.
700 to 724	Drive motor and drive mechanism failures detected by the master software.
725 to 799	Internal software failures detected by the master software.
800 to 999	Internal software and hardware failures detected by the safety software.

Table 4-5. Service Code Ranges

CAUTION Only trained, qualified personnel should attempt to repair the pump.

The corrective actions provided in Table 4-6 are listed in the order of typical fault. Module/assembly level troubleshooting techniques should provide a means of locating the actual part or assembly causing the fault. Prior to replacing any mechanical parts or circuit boards, ensure the problem is not being caused by loose flex cables or wire harnesses.

Code	Service Code Description	Corrective Action
44	**Invalid Software Versions** The master has detected incompatible versions of software installed on the pump.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
45	**Version Table Corrupted** The master has detected that the software version table is corrupted.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
101	**Analog to Digital Converter (ADC) Failure** Never received an end of conversion signal from the master ADC.	Replace the global brain board.
102	**Encoder Failure** Read of encoder gave invalid value.	• Check the connections between the motor and interface board connector J26. • Replace the motor assembly. • Replace the interface board. • Replace the global brain board.
103	**Encoder Failure** Read of encoder indicated overflow or underflow.	• Check the connections between the motor and interface board connector J26. • Replace the motor assembly. • Replace the interface board. • Replace the global brain board.
104	**Encoder Failure** Could not obtain a stable reading from the encoder.	• Check the connections between the motor and interface board connector J26. • Replace the motor assembly. • Replace the interface board. • Replace the global brain board.
106	**EEPROM Write Page Failure** Verification of data written to the EEPROM failed.	Replace the global brain board.
107	**Flash Erase Failure** Erase of block of flash memory failed.	Replace the global brain board.
108	**Invalid Flash Device Detected**	Replace the global brain board.
109	**Flash Write Failure** Write of data to flash memory failed.	Replace the global brain board.
110	**Flash Write Failure** Verification of data written to flash memory failed.	Replace the global brain board.
111	**Invalid CPU ID Detected**	Replace the global brain board.
112	**Timer Test Failed** Did not detect clock edge from the Real Time Clock.	Replace the global brain board.

Table 4-6. Service Codes

Code	Service Code Description	Corrective Action
113	**Timer Test Failed** Did not detect clock edge from the Real Time Clock.	Replace the global brain board.
114	**Timer Test Failed** Period of Real Time Clock did not match master clock.	Replace the global brain board.
115	**Timer Test Failed** No transition of 32 KHz clock detected.	Replace the global brain board.
117	**Safety Power Supply Voltage Out Of Range**	Replace the global brain board.
118	**Safety Analog to Digital Converter (ADC) Reference Voltage Out Of Range**	Replace the global brain board.
119	**PLD0 Power Supply Voltage Out Of Range**	Replace the global brain board.
201	**Master Motor Disarm Test Failed**	Replace the interface board.
202	**Safety Motor Disarm Test Failed**	Replace the interface board.
203	**IrDA Initialization Failure** Unable to initialize IrDA port.	• Replace the IrDA harness. • Replace the IrDA assembly. • Replace the interface board. • Replace the global brain board.
401	**Battery Monitor Voltage Check Failure** Main voltage too low.	• Replace the batteries. • Replace the global brain board. • Replace the interface board.
403	**Invalid Vmain From Safety** The safety did not send a valid reading of Vmain to the master.	Replace the global brain board.
451	**Thumbpress Sensor Failure** The thumbpress sensor did not become disengaged when the syringe was removed.	• Check the connection between the thumbpress sensor and interface board connector J26. • Troubleshoot/replace the thumbpress sensor.
452	**Flange Sensor Failure** The Flange detector did not become disengaged when the syringe was removed.	• Check the connection between the flange detector and interface board connector J29. • Troubleshoot/replace the flange detector.
501	**Service Data Corrupted** The service data has been corrupted.	Turn the pump OFF and back ON. If failure recurs, replace the global brain board.
502	**Configuration Data Corrupted** The configuration data has been corrupted.	Turn the pump OFF and back ON. If failure recurs, replace the global brain board.
503	**Prescription Data Corrupted** The prescription data has been corrupted.	Turn the pump OFF and back ON. If failure recurs, replace the global brain board.
504	**Service Log Data Corrupted** The service log data has been corrupted.	Turn the pump OFF and back ON. If failure recurs, replace the global brain board.

Table 4-6. Service Codes

Code	Service Code Description	Corrective Action
505	**Device Log Data Corrupted** The device log data has been corrupted.	Turn the pump OFF and back ON. If failure recurs, replace the global brain board.
506	**Event Log Data Corrupted** The event log data has been corrupted.	Turn the pump OFF and back ON. If failure recurs, replace the global brain board.
507	**Drug Limit Data Corrupted** The drug limit data has been corrupted.	Turn the pump OFF and back ON. If failure recurs, replace the global brain board.
601	**Safety External Analog to Digital Converter (ADC) Initialization Failure** Unable to initialize the safety external ADC.	• Replace the interface board. • Replace the global brain board.
602	**Safety External Analog to Digital Converter (ADC) Timeout Failure** Never received the end of conversion signal from the safety external ADC.	• Replace the interface board. • Replace the global brain board.
603	**Safety External Analog to Digital Converter (ADC) SPI Timeout Failure** Communication with the safety external ADC timed out.	• Replace the interface board. • Replace the global brain board.
604	**Safety External Analog to Digital Converter (ADC) Overrange Failure** Safety external ADC returned an overrange conversion result.	• Check the connections between the occlusion, syringe diameter, and linear position sensors and interface board connectors J26, J36, and J35 respectively. • If needed, replace the occlusion, syringe diameter, or linear position sensors. • Replace the interface board.
605	**Voltage Out Of Range** The power supply voltage monitored by the safety was out of range.	• Replace the interface board. • Replace the global brain board.
606	**Analog to Digital Converter (ADC) Loopback Test Failure** The voltage reading on the ADC loopback test was out of range.	• Replace the interface board. • Replace the global brain board.
607	**Analog to Digital Converter (ADC) Loopback Test Failure** Unable to read the ADC for loopback test.	• Replace the interface board. • Replace the global brain board.
608	**Real Time Clock Test Failure** A safety test of the RTC failed.	Replace the global brain board.
609	**Motor Failure** The safety detected motor movement when the motor should be stopped.	• Check the connection between the motor and interface board connector J26. • Replace the motor assembly. • Replace the interface board. • Replace the global brain board.

Table 4-6. Service Codes

Code	Service Code Description	Corrective Action
610	**Analog to Digital Converter (ADC) Timeout Failure** Never received the end of conversion signal from the safety internal ADC.	Replace the global brain board.
611	**Analog to Digital Converter (ADC) Error** Safety external ADC unable to obtain force sensor reading.	• Check the connection between the occlusion sensor and interface board connector J26. • Replace the occlusion sensor. • Replace the interface board.
612	**Analog to Digital Converter (ADC) Error** Safety external ADC unable to obtain the syringe diameter sensor reading.	• Check the connection between the syringe diameter sensor and interface board connector J36. • Replace the syringe diameter sensor. • Replace the interface board.
613	**Analog to Digital Converter (ADC) Error** Safety external ADC unable to obtain the linear position sensor reading.	• Check the connection between the linear position sensor and interface board connector J35. • Replace the linear position sensor. • Replace the interface board.
616	**Analog to Digital Converter (ADC) Error** Safety internal ADC unable to obtain a reading of the PCA button.	• Check the connection between the PCA connector and interface board connector J40. • Replace the interface board. • Replace the global brain board.
617	**Sensor Test Failure** Improper sensor reading obtained during calibration.	• Check connections between the occlusion, syringe diameter, and linear position sensors and the interface board connectors J26, J36, and J35 respectively. • Replace the occlusion, or syringe diameter, or linear position sensor. • Replace the interface board.
701	**Motor Error** The motor control has failed to maintain the proper motor position.	• Check the device log for a service code immediately before or after the 701 failure. If another service code is present, run the pump to see if the 701 failure recurs. If failure recurs, or if no other service code is present, do the following: • Check the connections between the motor and interface board connector J26. • Replace the motor assembly. • Replace the interface board. • Replace the global brain board.
725 to 737	**Invalid Calibration Message** The master received an invalid calibration message from the safety.	• Perform the calibration procedure again. If failure recurs, check sensor flex circuit connections. • Replace the global brain board.
738	**Invalid Command From Safety** The master received an invalid command from the safety.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
739	**Communications Timeout** The master did not receive a response from the safety.	Check the device log for a service code immediately before or after the 739 failure. If another service code is present, run the pump to see if the 739 failure recurs. If failure recurs, or if no other service code is present, replace the global brain board.

Table 4-6. Service Codes

Code	Service Code Description	Corrective Action
801	**Sensor Test Failure** Improper sensor reading obtained during calibration.	• Check connections between the occlusion, syringe diameter, and linear position sensors and the interface board connectors J26, J36, and J35 respectively. • Replace the occlusion, or syringe diameter, or linear position sensor. • Replace the interface board.
803	**Sensor Test Failure** Improper sensor reading obtained during the sensor test.	• Check connections between the occlusion, syringe diameter, and linear position sensor and the interface board connectors J26, J36, and J35 respectively. • Recalibrate the occlusion, syringe diameter, and linear position sensors. If failure recurs, replace the occlusion, syringe diameter, and linear position sensors, or interface board.
813	**Flash CRC Failure** The safety flash CRC check failed.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
818	**Linear Position Calibration Motor Failure** The master failed to stop the motor at the end of a linear position calibration.	• Check the connections between the motor and interface board connector J26. • Replace the interface board. • Replace the global brain board. • Replace the motor assembly.
820	**Invalid Command From Master** The safety received an invalid command from the master.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
821	**Invalid Linear Position Data** Invalid data was detected in the linear position calibration table.	Recalibrate the linear position sensor. If failure recurs, refer to * NOTE 1 at the end of this table for specific information.
832	**Communications Failure** The safety has received too many NACKs from the master.	Replace the global brain board.
834	**Communications Failure** The safety has reached the maximum number of retries in sending a message to the master.	Check the device log for a service code immediately before or after the 834 failure. If another service code is present, run the pump to see if 834 failure recurs. If failure recurs, or if no other service code is present, replace the global brain board.
858	**Invalid Syringe Size** The safety has detected a syringe diameter size that is not valid for the confirmed syringe type.	• Check the connection between the syringe diameter sensor and interface board connector J36. • Replace the syringe diameter sensor. • Replace the interface board. • Replace the global brain board.
863	**Drug Limit Exceeded** The safety has detected that the drug limit has been exceeded.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
865	**EEPROM CRC Failure** The safety EEPROM CRC check failed.	Turn the pump OFF and back ON. If failure recurs, replace the global brain board. If failure does not recur, recalibrate the occlusion, syringe diameter, and linear position sensors.

Table 4-6. Service Codes

Code	Service Code Description	Corrective Action
868	**Safety PCA Bolus Check Failed**	Check the PCA Button. If failure recurs, replace the PCA Cable.
871	**End Of Travel Failure** The master failed to stop the motor at the end of travel.	Recalibrate the linear position sensor. If failure recurs, replace the linear position sensor, or the interface board, or the global brain board.
874	**Syringe Misload Failure** The safety has detected a syringe misload condition but the master has not stopped the infusion.	• Check the connection between the thumbpress sensor and interface board connector J26. • Replace the thumbpress sensor. • Replace the interface board. • Replace the global brain board.
876	**Occlusion Pressure Too High** The safety has detected a pressure reading that is too high, but the master has not stopped the infusion.	• Check the connection between the occlusion sensor and interface board connector J26. • Replace the occlusion sensor. • Replace the interface board. • Replace the global brain board.
919	**Drug Limit Failure** The safety failed to receive a drug limit message from the master.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
920	**Drug Limit Failure** The safety received a drug limit message from the master at the wrong time.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
921	**Drug Limit Failure** The master and the safety do not agree on the drug limit volume.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
926	**Invalid Software Versions** The safety has detected incompatible versions of software installed on the pump.	Turn the pump OFF and back ON. If failure recurs, contact your local Baxter Service Center for technical assistance.
943 and 944	**Bad Linear Position Calibration** Sensor data from the linear position sensor invalid during calibration.	• Check the connection between the linear position sensor and interface board connector J35. • Replace the linear position sensor. • Replace the interface board.
952	**Communications Timeout** The safety did not receive a message from the master within the timeout period.	Check the device log for a service code immediately before or after the 952 failure. If another service code is present, run the pump to see if 952 failure recurs. If failure recurs, or if no other service code is present, replace the global brain board.
961	**Linear Position Check Failure** The linear position sensor indicates incorrect movement of the plunger.	Recalibrate the linear position sensor. If failure recurs, check the wire harness connection, replace the linear position sensor, or replace the interface board.
984	**Linear Position Check Failure** The linear position sensor indicates incorrect movement of the plunger.	Recalibrate the linear position sensor. If failure recurs, check the wire harness connection, replace the linear position sensor, or replace the interface board.

Table 4-6. Service Codes

Code	Service Code Description	Corrective Action
986	**Linear Position Calibration Motor Failure** The master stopped the motor too soon during a linear position calibration.	• Check the connection between the motor and interface board connector J26. • Replace the interface board. • Replace the motor assembly. • Replace the global brain board.
989	**Bad Linear Position Calibration** Sensor data from the linear position sensor invalid during calibration.	• Check the connection between the linear position sensor and interface board connector J35. • Replace the linear position sensor. • Replace the interface board.

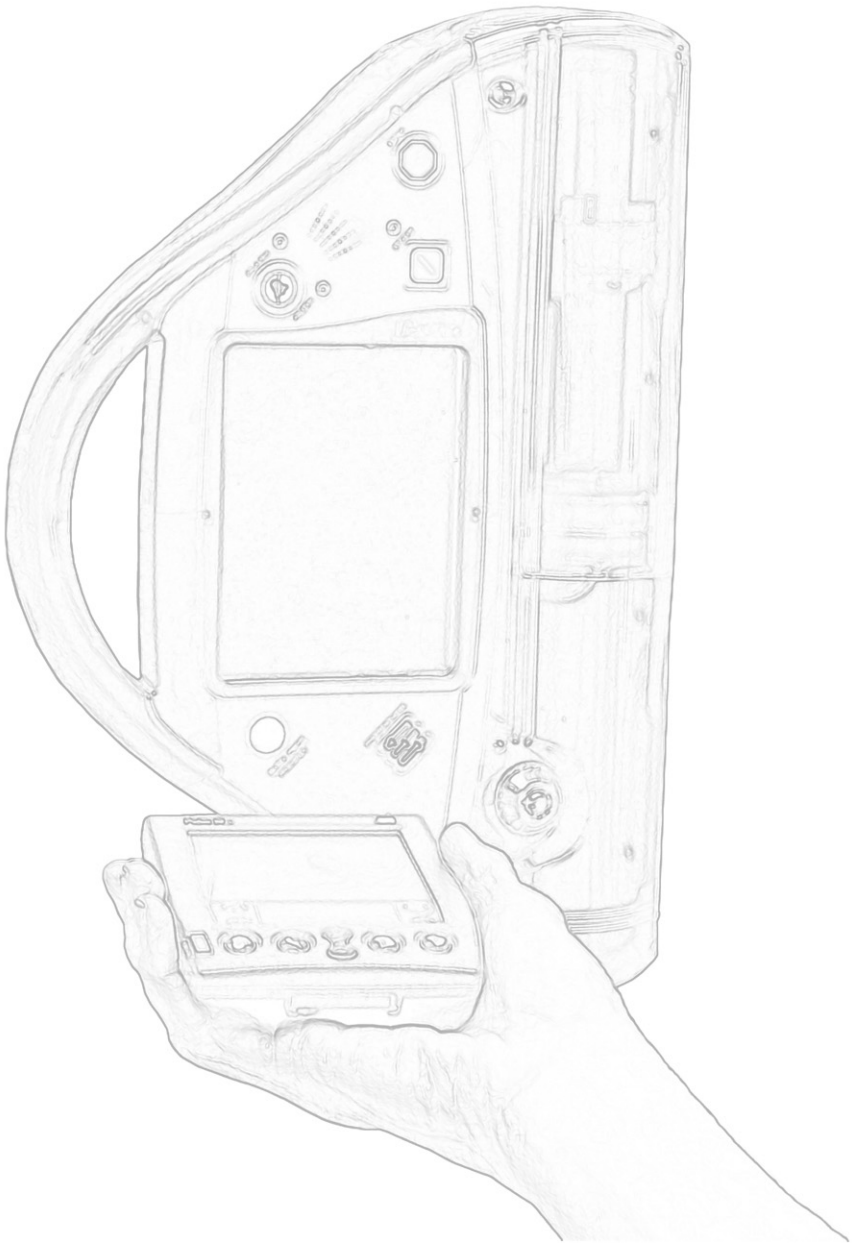
Table 4-6. Service Codes

* NOTE 1. The following is a more detailed description of the corrective action recommended for service code 821.

Attempt to recalibrate the linear position sensor. If you are unable to get to the linear position calibration screen because service code 821 keeps happening, try moving the pusher block at least an inch in either direction.

a. If it is impossible to find a location along the path of the pusher block where the service code 821 does not occur, then replace either the linear position sensor, the interface board, and/or the global brain board.

b. If a location is found where the service code 821 does not occur, try performing a linear position calibration from this point. Since the pusher block is not fully extended, you will not be able to perform a normal linear position calibration. In this case, move the pusher block to a location where the service code 821 does not occur, then start a linear position calibration, but cancel it before the pusher block reaches the end of travel. This should leave the pump with an uncalibrated linear position sensor. This will prevent the service code 821 from occurring. Now do a valid linear position calibration. Once the calibration is complete, move the pusher block throughout its range of travel to make sure the service code 821 does not occur.



5 - Service Mode

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Overview

The Service Mode feature provides details on the pump calibration procedures and other functional tests in addition to showing informational displays of pump internal status.

NOTE: To enter the Service Mode, the current patient history must be cleared from the pump. If the history from the most recent patient is needed for record keeping purposes, the information should be downloaded to a printer or PDA prior to entering the Service Mode.

Entering the Service Mode

1. Press and hold the HISTORY button, then press the ON/OFF button to turn the pump ON. Continue to hold the HISTORY button until the Service Mode display appears.
2. Enter the Service Security Code (31415) and press the ENTER key.
3. If the display asks "Do you want to clear Patient History?", press YES.
4. Refer to Figure 5-1. Once the security code is entered, the service mode screen appears on the display. In addition to the seven features shown on the display, four more features will appear on the list when using the SCROLL UP and SCROLL DOWN keys.
5. To select a specific service mode feature, use the SCROLL UP and SCROLL DOWN keys to highlight the feature desired, then press the ENTER key.

The specific features are explained in sequence on the following pages.

6. To exit the Service Mode, press and hold the Power ON/OFF button to turn the pump OFF.

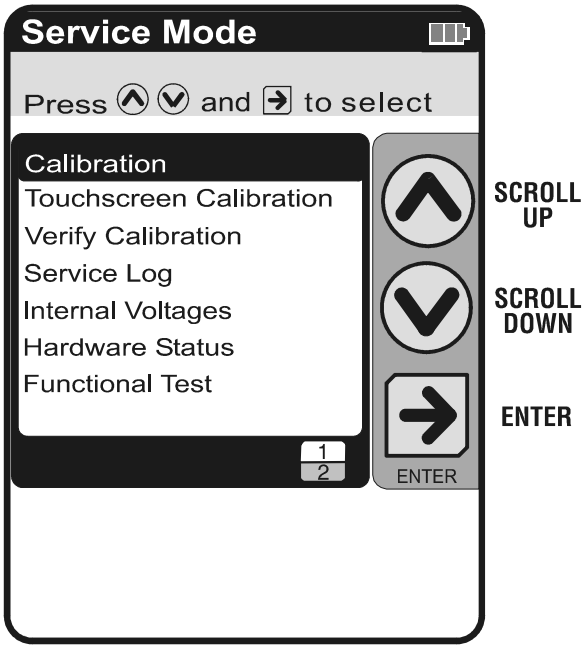

Figure 5-1. Service Mode Screen

Service Mode Features

Calibration

Several sensors are incorporated into the pump to help ensure safety and the accuracy of the infusion. Three of these sensors require calibration after certain repairs are performed and if the pump fails a functional test.

When the "Calibration" feature is selected, a separate procedure can be selected for each of these sensors. The three sensors that require calibration are:

- Barrel - where the Syringe Diameter Sensor is calibrated for specific syringe diameters.
- Pressure - where the Occlusion Sensor is calibrated for syringe back pressure.
- Linear - where the Linear Position Sensor is calibrated to monitor syringe plunger position.

Refer to Section 6 of this manual for the pump calibration and verification procedures.

Touchscreen Calibration

This feature is used to calibrate the touchscreen so that the pump will properly interpret presses on the touchscreen. Refer to Section 6 of this manual when the touchscreen requires calibration.

Verify Calibration

At the end of each calibration procedure in Section 6, there is an associated verification procedure. That verification procedure should be performed as written to ensure that the sensors have been properly calibrated.

To assist with pump troubleshooting, this Verify Calibration feature can also be used to check pump sensor operation even when the calibration procedures are unneccessary.

When this Verify Calibration feature is selected, the options of "Verify Sensors" and "Verify Touchscreen" are available.

NOTE: If the display indicates "Not Calibrated", proceed to Section 6 of this manual and perform the pump calibration procedures.

Verify Sensors

This feature provides a way to assess the operation of the pump sensors. When "Verify Sensors" is pressed, the "Sensor Values" screen appears on the display.

1. To assess the operation of the syringe diameter sensor, check the "Barrel Size" reading on the screen and ensure the value changes as you raise and lower the pump’s barrel clamp.
2. To assess the operation of the pressure sensor, check the "Force" reading on the screen and ensure the value increases as you use a finger to press on the thumb press sensor. When pressure is removed from this sensor, the value should be 0.000.
3. To assess the operation of the linear position sensor, check the readings for the "Linear Position" and the eight "LP Sensors" shown on the screen, and ensure the values change as you fully squeeze the release lever and slide the pusher block through its path of travel. For this procedure, the specific values for the LP Sensors are not important. However, when the pusher block is positioned at the top end of its travel, the linear position reading should be 0.000.
4. Press the BACK key to exit "Sensor Values" and return to the Service Mode screen.

Verify Touchscreen

This feature provides a way to assess whether the touchscreen is operating properly. When "Verify Touchscreen" is pressed, the "Touchscreen Values" screen appears on the display.

1. The "Touchscreen Values" display shows five small white targets with blue borders; one in each of the four corners and one in the middle. Use a plastic stylus and sequentially touch the center white square of each target and observe that the center of the displayed “+” (crosshair) appears within the outer edge of the blue frame square on each target. If not, press the BACK key and perform the Touchscreen Calibration.
2. To further assess the touchscreen operation, press on the screen at a few different points and verify that the X and Y Position values change accordingly. A "+" sign should appear where you pressed on the screen.
3. Press the BACK key to exit "Touchscreen Values" and return to the Service Mode screen.

Service Log

This feature provides a means to review a list of the automatically entered pump service events, starting with the most recent events first. A maximum of 50 events will be stored in memory. When subsequent events occur, the first ones stored will be lost. Use the PAGE UP and PAGE DOWN keys to scroll through the information as needed.

1. Pressing the OPTIONS key provides access to the PRINT feature which allows the Service Log contents to be printed on an Infrared-enabled printer. (Refer to the *Syndeo PCA Syringe Pump Technical Specifications* for details on the recommended printer.) The contents of the Service Log are not removed by the printing process.
2. Press the BACK key to return to the Service Mode screen.

Internal Voltages

This feature provides a means to monitor several important voltage points within the pump electronics. This information may assist in the troubleshooting of pump problems.

1. If the pump is not operating properly, compare the values shown on this screen with the typical nominal values shown in Table 5-1. If the values indicated on the pump display are out of the limits specified, replace the assembly shown.
2. Press the BACK key to return to the Service Mode screen.

PARAMETER	NOMINAL	MIN	MAX	ASSEMBLY
Vmain	6V for D-Cell	4V	12V	Global Brain board
Vtemp	0.48V	0.45V	0.5V	Interface board
3Vvdd	3.3V	3.1V	3.5V	Global Brain board
Master 3.3V	3.3V	3.1V	3.5V	Global Brain board
Master 2.5V	2.5V	2.3V	2.8V	Global Brain board
Master ADC ref	3.0V	2.9V	3.5V	Global Brain board
Master DAC ref	3.0V	2.9V	3.1V	Global Brain board
Sensor 5V	5.0V	4.8V	5.3V	Interface board
PLD0 saf	3.3V	3.1V	3.5V	Global Brain board
Motor minus saf	--	5mA*	30mA	Interface board
Safety 3.3V	3.3V	3.1V	3.5V	Global Brain board
Safety ADC ref	3.0V	2.9V	3.1V	Global Brain board
PLD0 3.3V	3.3V	3.1V	3.5V	Global Brain board
D-Cell	6V	3.9V	6.5V	Interface board, or Pump Power board, or Battery Pack board
Encoder	--	4.8V*	5.3V	Interface board
pump current	0.25A	0.1A	1A	Interface board
Vmain (regulator)	5V	4.8V	5.3V	Interface board

* The value displayed on the pump screen will be closer to zero at low fluid delivery rates, but higher at higher delivery rates due to the motor being "ON" more at higher rates.

Table 5-1. Internal Voltages Reference Values

Hardware Status

This feature displays the "current" status of the hardware sensors and switches. This information may assist in the troubleshooting of pump problems. By pressing the various front panel buttons and sensors, the status of the selected item should change accordingly.

Press the BACK key to return to the Service Mode screen.

Functional Test

! WARNING ! **Never use this feature when the pump is connected to a patient!**

CAUTION THE PUMP CAN BE SEVERELY DAMAGED if, after repair, this feature is enabled prior to calibrating the pump! The calibration process sets the "end of travel" point for the pump's drive mechanism. Parts of the drive mechanism could be damaged if the end of travel has not been calibrated and the pusher block reaches its mechanical limit.

This feature provides the opportunity to run a simulated infusion without the need to monitor all of the pump sensors. A syringe need not be in the pump for this feature to be used. When this feature is enabled, pump operation can be assessed during the troubleshooting process. Once a simulation is started, it is possible to change the display to one of the other service mode screens to assess pump operation. During the simulation, when the pusher block reaches the end of travel, an alarm will sound and the simulation will end. To restart the simulation, move the pusher block back to the top of path, return to the Functional Test screen and begin the process again.

A simulation default setup provides values for a B-D 60 mL syringe with a rate of 10.0 mL/hr and a VTBI of 20 mL. However, the "Syringe" key, "Rate" key, and "VTBI" key can be used to change the parameters to other values. In many cases, a faster rate may provide a better simulation.

For example:

1. Press the Rate key and change the value to 120 mL/hr, then press ENTER.
2. Press the VTBI key and change the value to 60, then press ENTER.
3. Press the START button to begin the simulation.
4. While the simulation is running, press the BACK key on the display to return to the Service Mode screen.
5. Select Verify Calibration, then Verify Sensors.
6. The status of the pump sensors can now be monitored.
    - The Linear Position should be increasing as the pusher block moves forward.
    - The Linear Position (LP) Sensors displayed values should change as an indication that the pusher block and drive mechanism are operating.
    - In addition, moving the barrel clamp up and down will provide a change in the "Barrel Size" reading.
    - Pressing the Thumb Press button on the pusher block will give an indication of "Force" on the display; the more pressure applied, the higher the reading.

7. Press the STOP button to interrupt the simulation.
8. Press the BACK key to return to the Service Mode screen.

Software Update

This feature is only used to load software updates into the pump. This feature has no other purpose. Contact your local Baxter representative for information on software upgrades.

If you highlight this feature and press ENTER, a confirmation screen appears. DO NOT press "YES" unless the pump software is actually being upgraded!

If "YES" is pressed in error, the screen will go blank and the pump will remain in the "Update" mode. The pump will not function and pressing the Power ON/OFF button will have no effect.

To return the pump to normal operating mode perform the steps below:

1. Remove and reinstall the battery pack. The Alarm light will flash and the buzzer will chirp to indicate that power was removed.
2. While holding down both the MUTE and PREFERENCES buttons, press the Power ON/OFF button to turn the pump ON. The pump will return to normal operating mode.

Pump Info

The feature provides a list of pump operating parameter totals and provides the date and time of the most recent pump calibration.

A second function of this feature is to permit the entry of the pump serial number. The current serial number stored in memory is displayed on this screen. This serial number must coincide with the serial number shown on the back of the pump. This function IS NOT to be used as a means of storing inventory control numbers or similar numbers.

NOTE: All memory devices are located on the global brain board. If this circuit board is replaced, all pump settings, including the serial number, must be re-entered. The pump must be considered as a newly received device and reference should be made to the *Syndeo PCA Syringe Pump Configuration Guide* for the procedures needed to set up the pump.

1. To enter the pump’s serial number, press SET SN.
2. A confirmation screen appears on the display. Press NO to return to the Pump Information screen or press YES to proceed to the Serial Number Entry screen.

NOTE: The "shift" key switches the letters screen between upper and lower case while the "abc/123" key switches the screen between letters and figures.

3. Press the BACK key to return to the Pump Information screen or, after entering a serial number, press the ENTER key to save the new number and return to the Pump Information screen.
4. Verify that the "Serial Number" displayed on the screen coincides with the one just entered.
5. Press the BACK key to return to the Service Mode screen.

IrDA (Infrared Communication) Test

The abbreviation "IrDA" stands for Infrared Data Association. This organization creates standards for the use of Infrared light as a method of data communication.

This feature is used to test the Infrared communications capability of the pump with an IrDA-enabled printer or personal data assistant (PDA) device. Follow the procedure below to test the IrDA communication process.

CAUTION Always comply with any local guidelines regarding the printers, PDAs, and computers that might be used in conjunction with this product.

1. On the Options display, press either the PDA icon "UPLOAD" or the printer icon "PRINT" to select communication with that device.
2. Align the IrDA port of the PDA or printer with the pump's IrDA port and press the OKAY key on the pump display to begin the information transfer. The pump display will go black and the data transfer will begin.

NOTE: If the IrDA test is started and no printer or PDA is in place, a "Retry?" screen will appear which permits one to try again or exit from this feature.

3. Both devices MUST remain aligned until the transfer of information is complete.
4. The data transfer will start and stop automatically. When the transfer of data is complete, the pump display will turn back on and show the "Report Complete" screen.

NOTE: If the pump display does not turn on after the data transfer is completed, touch the LCD screen.

5. For a printer only:

   When sending to a printer, printing should begin during the data transfer and complete when the printer's data buffer is empty.

6. For a PDA only:

   When sending to a PDA, the data will be temporarily stored in the PDA memory.

   After the data transfer, the PDA display will ask, "Do you want to accept . . .?"

   Select "YES" on the PDA display, to accept the message into the PDA.

   To ensure the test transmission completed successfully, access the PDA Memo Pad feature and display the message contents.

   Access the PDA Memo Pad feature and display the message contents on the PDA to ensure that the test transmission completed successfully.

   Turn off the PDA device to conserve its power. (Delete the IrDA test message from the PDA when it is no longer needed.)

Calibration Date/Time

During normal operation, the Power Up Complete screen permits the setting of the date and time. But when calibration is required, the normal Power-ON sequence is interrupted, and the Service Mode must be entered. Since the date and time stored in the pump may be incorrect, this feature allows entry of the correct date and time before calibration.

1. For the date, enter a two-digit month, followed by a two-digit day, followed by a two-digit year, then press ENTER.
2. For the time, enter a two-digit hour (24 hour time), followed by two-digit minutes, then press ENTER.

   The next time the pump is calibrated, the data and time entered through this feature will be stored in memory and will display when the Pump Info feature is selected.

Once the date and time are entered the display automatically returns to the Service Mode screen. Future calibration events will use the current values.

NOTE: The Real Time Clock device is mounted on the global brain board. When normal power is turned OFF, this device is powered by a Lithium Battery. The longevity of this battery is several years. If the pump date and time feature becomes erratic, the cause might be this internal battery.

6 - Pump Calibration & Verification

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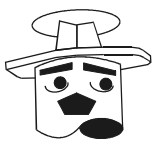
Overview

This chapter contains the calibration and verification procedures for the pump sensors. For accurate results and proper pump operation, always perform the sensor verification procedure immediately following each sensor calibration.

As part of the routine maintenance schedule, the sensor verification procedures in this section can be performed independently of the calibration procedures.

Perform the sensor calibration when any of the following conditions occur:

- A service code indicates that calibration is required.
- Repairs affect any of the pump sensors requiring calibration.
- The calibration verification procedures indicate that calibration is needed.



HINT: If verification indicates that a sensor is properly calibrated, then the calibration procedure for that sensor need not be performed.

Pump Calibration & Verification Requirements

Refer to Table 6-2. Calibration or verification of pump sensors may be required depending on the specific parts and assemblies replaced. The following table specifies which procedures to perform.

Part/Assembly Disassembled or Replaced	Calibration & Verification Required
Interface Board	All Calibration/Verification Procedures.
Global Brain Board	All Calibration/Verification Procedures.
Circuit Board Stack	All Calibration/Verification Procedures.
Touchscreen or LCD/Touchscreen Assembly	Touchscreen Calibration/Verification.
Syringe Diameter Sensor	Syringe Diameter Sensor Calibration/Verification.
Barrel Clamp Assembly	Syringe Diameter Sensor Calibration/Verification.
Drive Mech Assembly or any Drive Mech parts	Occlusion Sensor & Linear Position Sensor Calibration/ Verification.
Plunger Housing or any internal Plunger Housing parts (Load Beam Assy, Flipper Assy)	Occlusion Sensor & Linear Position Sensor Calibration/ Verification.
Pusher Block & Outer Tube Assembly	Occlusion Sensor & Linear Position Sensor Calibration/ Verification.
Plunger Hood	Occlusion Sensor & Linear Position Sensor Calibration/ Verification.
Linear Position Sensor	Occlusion Sensor & Linear Position Sensor Calibration/ Verification.

Table 6-1. Pump Calibration Requirements

Required Equipment

Refer to Table 6-1. The following pieces of equipment are required for these procedures. If these items are not available, contact your Baxter representative for further information.

Item #	Description	Baxter Part #
1	Small Barrel Size Gauge	921-5000-411
2	Medium Barrel Size Gauge	921-5000-412
3	Large Barrel Size Gauge	921-5000-413
4	Linear Starting Position Gauge	921-5000-423
5	Weight Hanging Test Bracket [1 lb ± 0.06% (453.59 g ± 0.06%)]	921-5001-876
6	Weight [16.0 lb ± 0.03% (7,257.48 g ± 0.03%)] or a combination of weights that can be connected with a hooking device to equal a total of 16.0 lb (weights should be ASTM Class 7 or better)	N/A
7	Linear Position Verification Gauge	921-5001-906
8	Stylus (Plastic)	N/A
9	Syringe (B-D or MONOjECT 60 mL)	N/A

Table 6-2. Required Equipment

Initial Setup

Use a copy of the two-page *Calibration Verification Data Sheet*, located at the end of this section, to record the results and the PASS or FAIL conditions for the pump.

Calibration and verification procedures may be performed independently. However, when complete pump calibration is required, always perform the calibration and verification procedures in the sequence provided.

1. Locate the serial number label on the rear of the pump and enter the serial number at the top of the *Calibration Verification Data Sheet*.
2. Install a D-Cell Battery Pack containing fresh batteries into the rear of the pump.

CAUTION The Occlusion Sensor must be calibrated prior to calibrating the Linear Position Sensor.

Pump Calibration & Verification Sequence

Touchscreen Calibration

1. To calibrate the touchscreen, press and hold the STOP button while pressing the Power ON/OFF button to turn the pump ON. Continue to hold the STOP button until the Screen Calibration display appears.
2. Before starting, verify that the first displayed "+" (crosshair) target is in the lower right corner of the display. If it is not, turn the pump OFF and repeat steps 1 and 2.
3. Using a plastic stylus, sequentially press the center of each of the crosshairs as they appear in the corners of the touchscreen. After all four corners are pressed, the pump completes the Power-ON Self Test and the Power Up Complete screen appears.
4. Press and hold the Power ON/OFF button until the pump turns OFF.

Entering the Service Mode

NOTE: Access to the Service Mode is not permitted when Patient History is stored in the pump. If the history from the most recent patient is needed for record keeping purposes, the information should be downloaded to a printer or PDA.

1. Press and hold the HISTORY button, then press the Power ON/OFF button to turn the pump ON. Continue to hold the HISTORY button until the Service Mode display appears.
2. Enter the Service Security Code of 31415 and press the ENTER key.
3. If the display asks "Do you want to clear Patient History?", press YES.

NOTE: If a calibration alarm or message occurs prior to setting the pump's correct time and date, proceed to calibrate the pump first. Include the actual date on the *Calibration Verification Data Sheet*, then set the pump's correct time and date after completing the calibration procedures.

Touchscreen Verification

1. From the "Service Mode" screen, press the SCROLL UP key or the SCROLL DOWN key on the display until "Verify Calibration" is highlighted, then press the ENTER key.

2. Select the "Verify Touchscreen" option.
3. The Touchscreen Verification display shows five small white targets with blue borders; one in each of the four corners and one in the middle. Use a plastic stylus and sequentially touch the center white square of each target and verify that the center of the displayed “+” (crosshair) appears within the outer edge of the blue frame square on each target. If not, press the BACK key and perform the Touchscreen Calibration again.
4. If the center of all five crosshairs appears within the outer edge of the blue borders, circle PASS on the *Calibration Verification Data Sheet* and continue to step 6. If the centers of the crosshairs are located outside the borders, then circle FAIL on the *Calibration Verification Data Sheet*.
5. If the touchscreen verification fails, perform the Touchscreen Calibration procedure, then verify once again. If the verification still fails, refer to Section 4 of this manual to troubleshoot the pump.
6. Press the BACK key to return to the "Service Mode" screen.

Serial Number Verification

1. Press the SCROLL UP key or the SCROLL DOWN key on the display until “Pump Info” is highlighted, then press the ENTER key.
2. If the serial number displayed on the "Pump Information" screen matches the serial number on the rear of the pump continue to step 7.
3. Press the SET SN key in the lower right corner of the display. Press YES to confirm that you want to set the serial number.
4. Use the keypad on the touchscreen to enter the serial number shown on the rear of the pump. Use the "shift" key to toggle the display between upper and lower case characters. Use the "abc" key to toggle the display to numbers and the "123" key to return to letters.
5. Press the ENTER key when finished entering the serial number.
6. Verify that the serial number displayed on the “Pump Information” screen matches the serial number on the rear of the pump. If so, circle PASS on the *Calibration Verification Data Sheet* and continue to step 8.
7. If the serial numbers do not match, repeat this process and re-enter the correct value. If the serial numbers still do not match, refer to Section 4 to troubleshoot the pump.
8. Press the BACK key to return to the "Service Mode" screen.

Occlusion Sensor Calibration

CAUTION The Occlusion Sensor must be calibrated prior to calibrating the Linear Position Sensor.

The Occlusion Sensor and the Linear Starting Position Gauge are used to determine the starting point for the Linear Position Sensor Calibration.

1. On the Service Mode Screen select “Calibration”, then select the “Pressure” option.
2. Use the pump’s pole clamp to attach the pump **upside down** onto a vertical pole.

3. Refer to Figure 6-1. Suspend the weight hanging test bracket from the occlusion sensor on the pusher block. Be sure to align the recess in the hanging bracket with the thumb press button and make sure that the bracket is not touching any other parts of the pump. Stop any swaying, so the hanging bracket is stable and there is less than a 35 count difference between the high and low fluctuating force value, then press OK on the display.

Figure 6-1. Occlusion Sensor Calibration Setup

4. Suspend the 16 lb. weight from the weight hanging test bracket. Again, make sure that the bracket and weight are not touching any other parts of the pump. Stop any swaying so the weight and hanger are stable and there is less than a 240 count difference between the high and low fluctuating force value, then press OK on the display.
5. The screen should indicate “Calibration Complete”. Press the OK key on the display, then remove the weight and the hanging test bracket.
6. If the calibration did not complete successfully, repeat this procedure. If the calibration still does not complete successfully, refer to Section 4 to troubleshoot the pump.
7. Press the BACK key to return to the "Service Mode" screen.

Occlusion Sensor Verification

1. On the Service Mode Screen select “Verify Calibration”, then select the “Verify Sensors” option.
2. Use the pump’s pole clamp to attach the pump **upside down** onto a vertical pole.
3. Refer to Figure 6-1. Suspend the weight hanging test bracket from the occlusion sensor on the pusher block. Be sure to align the recess in the weight hanging bracket with the thumb press button and make sure that the bracket is not touching any other parts of the pump. Stop any swaying so the weight is stable.
4. On the *Calibration Verification Data Sheet*, record the force value displayed (an approximate midpoint of the range, if the value is fluctuating) and verify that the force reading is within the required range.

5. Circle PASS on the *Calibration Verification Data Sheet* if the pressure is within the required range. Circle FAIL on the *Calibration Verification Data Sheet* if the pressure is outside the required range.
6. Suspend the 16 lb. weight from the 1 lb. weight hanger test bracket (for a total of 17 lbs.). Again, make sure that the bracket and weight are not touching any other parts of the pump. Stop any swaying so the weight is stable.
7. On the *Calibration Verification Data Sheet*, record the force value displayed (an approximate midpoint of the range, if the value is fluctuating) and verify that the force reading is within the required range.
8. Remove the weight and the hanging test bracket.
9. If the two force readings are within the required ranges, circle PASS on the *Calibration Verification Data Sheet*, and continue to step 11.
10. If the pump failed either of the two force verification steps, recalibrate the occlusion sensor and perform the verification again. If verification still fails, refer to Section 4 of this manual to troubleshoot the pump.
11. Press the BACK key to return to the "Service Mode" screen.

Syringe Diameter Sensor Calibration

1. Use the pump's pole clamp to attach the pump onto a vertical pole in its normal operating position.
2. On the Service Mode Screen select "Calibration", then select the "Barrel" option.
3. Refer to Figure 6-2. Place the small barrel size gauge (part # 921-5000-411) under the barrel clamp. Ensure it is sitting flat and not on the higher wall side of the syringe flange slot. Lift and then slowly lower the barrel clamp straight down onto the gauge. Avoid biasing the barrel clamp to either side. Hold the barrel clamp firmly against the gauge and press OK.

Figure 6-2. Syringe Diameter Sensor Calibration Setup

4. Remove the previous barrel gauge, then place the medium barrel size gauge (part # 921-5000-412) under the barrel clamp. Ensure it is sitting flat and not on the higher wall side of the syringe flange slot. Lift and then slowly lower the barrel clamp straight down onto the gauge. Avoid biasing the barrel clamp to either side. Hold the barrel clamp firmly against the gauge and press OK.
5. Remove the previous barrel gauge, then place the large barrel size gauge (part # 921-5000-413) under the barrel clamp. Ensure it is sitting flat and not on the higher wall side of the syringe flange slot. Lift and then slowly lower the barrel clamp straight down onto the gauge. Avoid biasing the barrel clamp to either side. Hold the barrel clamp firmly against the gauge and press OK.
6. The screen should now display “Calibration Complete”.
7. Remove the barrel gauge, then press the BACK key to return to the "Service Mode" screen.

Syringe Diameter Sensor Verification

1. Use the pump’s pole clamp to attach the pump onto a vertical pole in its normal operating position.
2. On the Service Mode Screen select “Calibration”, then select the “Verify Sensors” option.
3. Refer to Figure 6-2. Place the small barrel size gauge (part # 921-5000-411) under the barrel clamp. Ensure it is sitting flat and not on the higher wall side of the syringe flange slot. Lift and then slowly lower the barrel clamp straight down onto the gauge. Avoid biasing the barrel clamp to either side. Hold the barrel clamp firmly against the gauge, and record the displayed barrel size reading on the Calibration Verification Data Sheet. Verify that the reading is within the required range, then circle PASS or FAIL on the Calibration Verification Data Sheet.
4. Remove the previous barrel gauge, then place the medium barrel size gauge (part # 921-5000-412) under the barrel clamp. Ensure it is sitting flat and not on the higher wall side of the syringe flange slot. Lift and then slowly lower the barrel clamp straight down onto the gauge. Avoid biasing the barrel clamp to either side. Hold the barrel clamp firmly against the gauge, and record the displayed barrel size reading on the *Calibration Verification Data Sheet*. Verify that the reading is within the required range, then circle PASS or FAIL on the *Calibration Verification Data Sheet.*
5. Remove the previous barrel gauge, then place the large barrel size gauge (part # 921-5000-413) under the barrel clamp. Ensure it is sitting flat and not on the higher wall side of the syringe flange slot. Lift and then slowly lower the barrel clamp straight down onto the gauge. Avoid biasing the barrel clamp to either side. Hold the barrel clamp firmly against the gauge, and record the displayed barrel size reading on the *Calibration Verification Data Sheet*. Verify that the reading is within the required range, then circle PASS or FAIL on the *Calibration Verification Data Sheet.*
6. Remove the barrel gauge, then press the BACK key to return to the "Service Mode" screen.
7. If any of the three barrel size readings falls outside the specified range, recalibrate the syringe diameter sensor and perform the verification again. If verification still fails, refer to Section 4 of this manual to troubleshoot the pump.

Linear Position Sensor Calibration

CAUTION The Occlusion Sensor must be calibrated prior to the Linear Position Sensor. If the Occlusion Sensor is not calibrated first, the display shows "Occlusion Sensor Not Calibrated" when the "Linear" option is selected.

1. Use the pump's pole clamp to attach the pump onto a vertical pole in its normal operating position.
2. On the Service Mode Screen select "Calibration", then select the "Linear" option. The display will indicate "Insert Calibration Rod".
3. Refer to Figure 6-3. Move the pusher block up to its furthest position from the barrel clamp.
4. Pull out the barrel clamp, and insert the Linear Starting Position Gauge (part # 921-5000-423) up under the barrel clamp until the top end of the rod is against the thumb press sensor pin on the pusher block. **Be careful not to bend or bias the thumb press sensor pin.**
5. Position the lower end of the calibration rod so that the flange ring is located in the flange slot in the front housing.
6. Lower the barrel clamp against the calibration rod. The top sides of the calibration rod should be resting on the tips of the plunger retainers.
7. Keep the calibration rod straight by using your hand to hold the barrel clamp firmly against the calibration rod.
8. Press OK, and continue to hold the barrel clamp against the calibration rod while the pump motor advances the pusher block. When the correct calibration starting position is reached (based on the occlusion sensor force on the calibration rod and the rod length), the motor will stop.

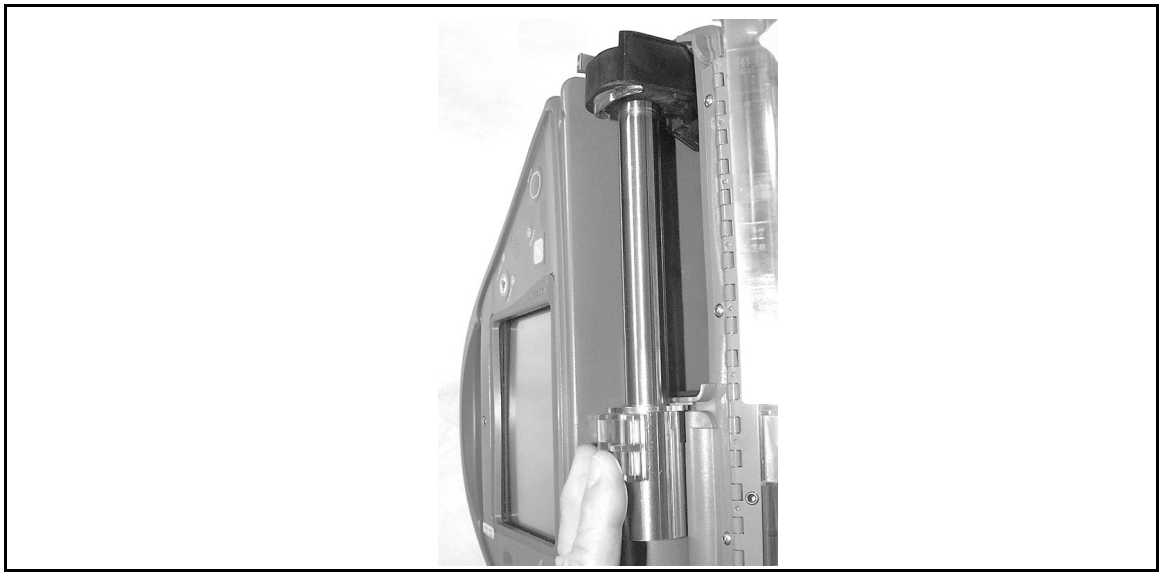


Figure 6-3. Linear Position Sensor Calibration Setup

CAUTION In step 9, DO NOT squeeze the pusher block release lever. DO NOT open the plunger retainers. DO NOT disengage the rotary nut.

9. Carefully raise the barrel clamp and pull out and down on the lower end of the calibration rod to release the flange ring and lower the rod out of the pump.
10. Once the calibration rod is removed, press OK on the LCD screen. The motor will start the automatic calibration procedure and the screen will show “Position Calibration Step 3”.
11. The automatic linear calibration process may take 15 to 20 minutes. **DO NOT press OK on the calibration screen.** When the linear calibration is complete, information will be displayed on the screen. (The screen display may go blank during this calibration process. Check for completion by touching the very top of the screen to turn the display back on.)
12. When the calibration is finished, the pump will automatically determine if the process was successful and display a notification stating either "Linear Position Sensor Calibration Complete" or "Invalid Linear Position Sensor Calibration".
13. If the calibration completed successfully, continue to step 15.
14. If the calibration did not complete successfully, repeat this procedure a second and third time if needed. If after three attempts the calibration still does not complete successfully, refer to Section 4 of this manual to troubleshoot the pump.
15. Press and hold the Power ON/OFF button to turn the pump OFF.

Linear Position Sensor Verification

NOTE: Access to the Service Mode is not permitted when Patient History is stored in the pump. If the history from the most recent patient is needed for record keeping purposes, the information should be downloaded via the Infrared Communication Port to a printer or PDA. Once the information is saved in this manner, clear Patient History to access the Service Mode.

1. Press and hold the HISTORY button, then press the Power ON/OFF button to turn the pump ON. Continue to hold the HISTORY button until the Service Mode display appears.
2. Enter the Security Code of 31415 and press the ENTER key.
3. If the display asks "Do you want to clear Patient History?", press YES.
4. On the Service Mode Screen select “Verify Calibration”, then select the “Verify Sensors” option.
5. Refer to Figure 6-4. Move the pusher block up to its furthest position from the barrel clamp.
6. Pull out the barrel clamp, and insert the Linear Position Verification Gauge (part # 921-5001-906) so that the flange ring is located in the flange slot in the front housing.
7. Lower the barrel clamp arm against the verification gauge.
8. Keep the calibration rod straight by using your hand to hold the barrel clamp firmly against the calibration rod.

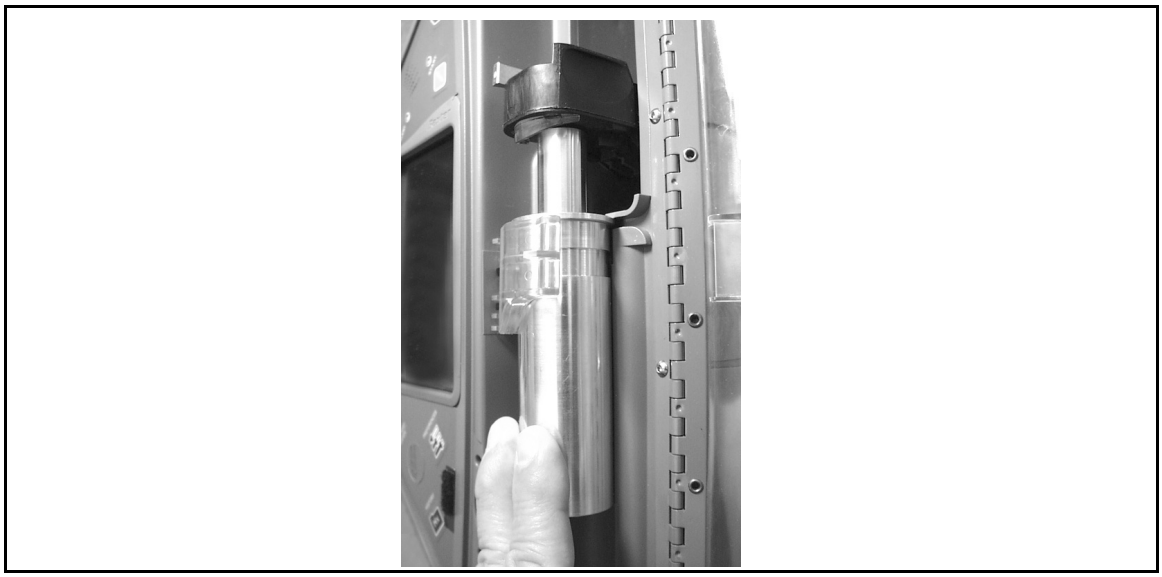


Figure 6-4. Linear Position Sensor Verification Setup

9. Use a second hand to squeeze the pusher block release lever and lower the pusher block until the thumb press pin and load beam reach the top of the gauge. While still squeezing the release lever, read the displayed linear position.
10. Release the pusher block release lever and gauge, then record on the *Calibration Verification Data Sheet* the value read in step 9.
11. If the recorded value is within the range given on the *Calibration Verification Data Sheet*, circle PASS and continue to step 13.
12. If the recorded value is outside the range shown on the *Calibration Verification Data Sheet*, recalibrate the Linear Sensor using the Linear Position Sensor Calibration procedure. If the Linear Position Sensor Verification cannot be brought within the listed range within three calibration attempts, mark FAIL on the *Calibration Verification Data Sheet* and refer to Section 4 of this manual to troubleshoot the pump.
13. Fully extend the pusher block by moving it to the top of travel (fully extended).
14. Verify that the displayed linear position value is 0.000”. Circle PASS or FAIL on the *Calibration Verification Data Sheet*.
15. Press BACK to return to the Service Mode screen.
16. Press and hold the Power ON/OFF button to turn the pump OFF.

Syringe Low & Syringe Empty Verification

1. Position the thumb press of an empty B-D or MONOjECT 60 mL syringe at the 10 mL mark.

NOTE: When performing this test for a quantity of pumps, a syringe may be re-used up to 20 times. To track the number of uses for a given syringe, it is recommended that a mark be placed on the syringe each time it is used in this manner.

2. Turn the pump ON and follow the screen directions.

3. Open and close the syringe door per the display prompts.

   If asked “Do you want to resume the existing therapy?” press NO.
   If asked “Do you want to clear patient history?” press YES.
   When asked “Do you want to prime the pump?” press NO.

4. Program a continuous infusion. Select mL and confirm mL.
5. Enter a dose of 99.9 mL/hr following the screen directions confirming prescription and the settings.
6. Answer NO to the question “Do you want to program a Loading Dose?”
7. Press the START button to start the continuous infusion.
8. During the infusion, near the 5 cc mark (5 ml), verify that the pump gives an audible alert, displays “SYRINGE VOLUME LOW”, and the yellow alert LED flashes. (You may need to touch the top of the screen to light the display in order to see the message.)
9. Press the check mark to continue the infusion.
10. Verify that the pump gives an audible alarm, displays "SYRINGE EMPTY", and the red alarm LED flashes. (In order to see the display, you may need to touch the top of the screen.) Record PASS or FAIL on the Calibration Verification Data Sheet.
11. Press and hold the Power ON/OFF button to turn the pump OFF.

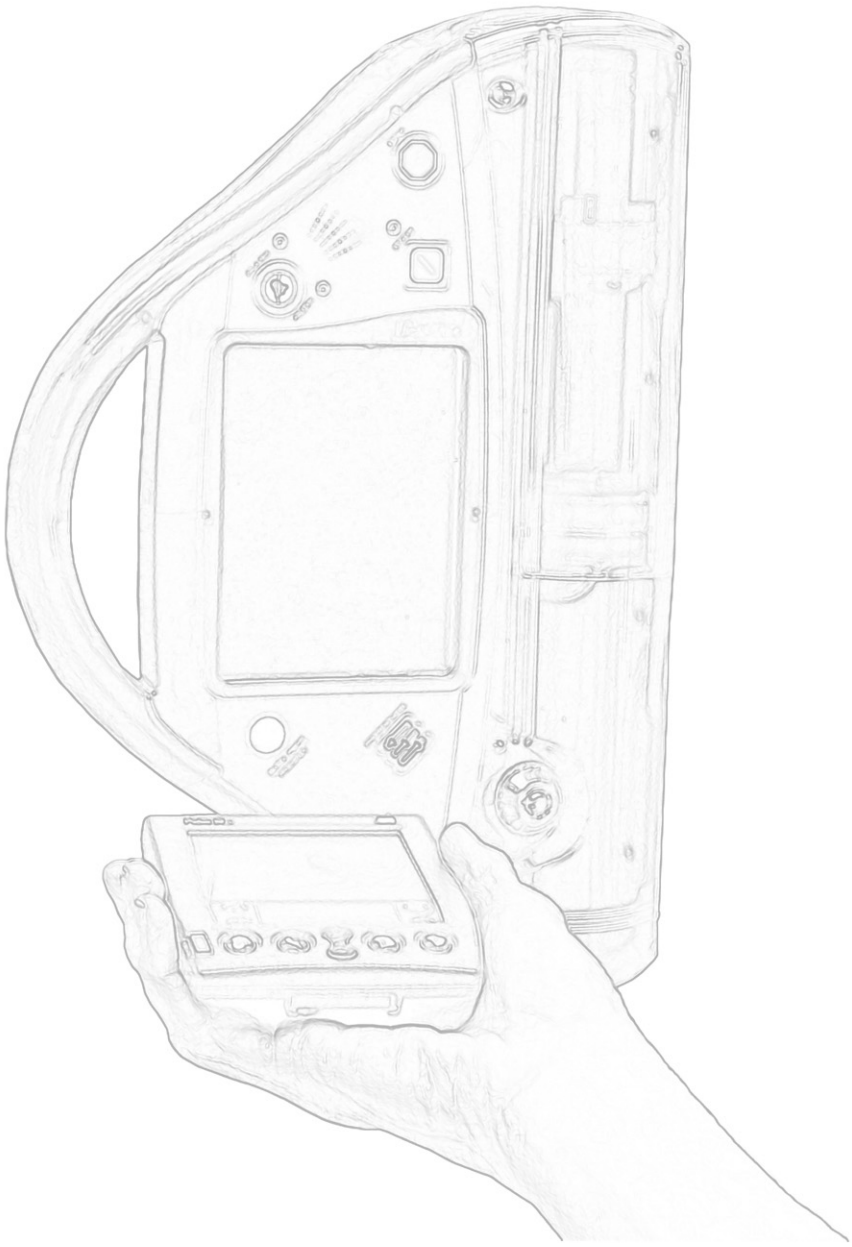
Power Up Diagnostics

1. With the pump turned OFF, press and release the Power ON/OFF button to turn the pump ON.
2. Verify that the pump successfully completes the Power-ON Self Test with the indications listed below. Record PASS or FAIL on the *Calibration Verification Data Sheet*.
   - The ALARM (red), ALERT (yellow), and INFUSION (green) lights briefly flash ON then OFF.
   - The buzzer sounds two long tones.
   - The display screen turns white, then black.
   - Three different audible tones sound from the speaker.
   - The buzzer sounds one short tone.
   - The “Power Up Complete” message appears at the top of the display.

NOTE: If a failure occurs, the pump will turn the LEDs ON and sound a continuous audible tone or issue a Service Code, depending on the type of failure encountered.

Record the Software Versions

1. With the pump turned ON, press the PREFERENCES button and then select “Pump Identifiers”.
2. Record the Master Software version number on the *Calibration Verification Data Sheet*.
3. Record the Safety Software version number on the *Calibration Verification Data Sheet*.
4. Turn the pump OFF.



Calibration Verification Data Sheet

Syndeo PCA Syringe Pump

Pump S/N: _____

DESCRIPTION	CRITERIA	VALUE	UNITS	CIRCLE PASS or FAIL	
Touchscreen Verification	Center of "+" within outer edge of blue square for all 5 targets.	N/A	N/A	PASS	FAIL
Serial Number Verification	Display matches pump's label.	N/A	N/A	PASS	FAIL
Occlusion Sensor Verification (with only 1 lb. hanger)	0.835 to 1.165		Lbs.	PASS	FAIL
Occlusion Sensor Verification (with 17 lbs. total)	14.450 to 19.550		Lbs.	PASS	FAIL
Syringe Diameter Sensor Small Barrel Size Verification	1.119 to 1.171		Inches	PASS	FAIL
Syringe Diameter Sensor Medium Barrel Size Verification	1.229 to 1.281		Inches	PASS	FAIL
Syringe Diameter Sensor Large Barrel Size Verification	1.314 to 1.366		Inches	PASS	FAIL
Linear Position Sensor Verification (Recalibrate if 1st or 2nd verification attempts are not within range)	3.930 to 3.970 1st verification: 2nd verification: 3rd verification:	_____ _____ _____	Inches	PASS	FAIL
Linear Position Sensor Verification (Fully Extended)	Must = 0.000	N/A	Inches	PASS	FAIL
Syringe Low & Empty Verification	Alert & Alarm must both occur.			PASS	FAIL

Tested by: _____ Date: _____

Pump S/N: _____

DESCRIPTION	CRITERIA	VALUE	UNITS	CIRCLE PASS or FAIL	
Power Up Diagnostics	• All three LEDs flash or flicker. • The buzzer sounds two long tones. • The display screen turns white, then black. • Three different audible tones sound from the speaker. • The buzzer sounds one short tone. • The "Power Up Complete" message appears at the top of the display.	N/A	N/A	PASS	FAIL
Master Software Version	Record Version #.		N/A	N/A	N/A
Safety Software Version	Record Version #.		N/A	N/A	N/A
Any Service Codes occurred during test	Circle PASS if no service codes occurred during testing.	Record any observations below.	N/A	PASS	FAIL
All Abnormalities	Circle PASS if no abnormalities occurred during test.	Record any observations below.	N/A	PASS	FAIL

Tested by: _____ Date: _____

7 - Disassembly & Reassembly

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Pole Clamp Reassembly 7-56

Overview

This section of the manual contains pump disassembly and reassembly procedures. Use these procedures whenever pump disassembly and repair is required.

For most assemblies and unique parts, specific reassembly procedures are provided. In some cases, there is only the need to reverse the steps used for the disassembly procedure.

NOTE: In some procedures, special fixtures may be required if disassembly continues past a certain point. Information about these special needs is included when appropriate.

Refer to Section 10 for exploded view drawings and their associated parts lists.

CAUTION Only trained, qualified personnel should attempt to repair the pump.

CAUTION The pump must be serviced in a static-free environment. When the pump is open, exercise extreme care to protect the circuit boards from static discharge. The inspection or repair station, all equipment, and personnel should be properly grounded.

CAUTION After the pump is reassembled, refer to Section 6 and perform the required pump calibration and verification procedures followed by the post repair checkout procedures provided in Section 8.

Tools & Materials

Baxter-Created Fixtures

The following tools and fixtures are required to properly assemble or adjust the internal parts of the pump. These fixtures are available from Baxter.

Part Number	Description
921-5000-443	PCA Connector Alignment Tool (used when replacing the PCA connector on the rear housing)
921-5000-458	Glove Fixture (used to align the circuit board stack in the glove)
921-5000-471	Display/Touchscreen Alignment Tool (used when replacing the touchscreen on the liquid crystal display)
921-5001-869-1	Flange Bar Height Adjustment Gauge (used when replacing the flange detector)
921-5001-869-2	Flange Bar Touches Check Gauge (used when replacing the flange detector)
921-5001-869-3	Flange Bar Gap Check Gauge (used when replacing the flange detector)
921-5001-869-4	Flange Present Check Gauge (used when replacing the flange detector)
921-5001-873	Syringe Door Alignment Fixture (used when replacing the syringe door lock)
AS5YU4001	Flex Circuit Test Box Fixture (used when replacing the flange detector and the drive mech slide assembly)

Table 7-1. Optional Tools & Fixtures

Required Tools & Equipment

The following tools are recommended for use in maintaining and repairing the pump. The repair procedures in this section assume these tools or their equivalent are available. Although listed, individual Torque tools are not required. As an option, adjustable tools can be used which satisfy a range of torque requirements.

Required Tool
ESD Protection Station
Torque Tool - 3.0 ± 0.30 in-oz
Torque Tool - 20.0 ± 2.0 in-oz
Torque Tool - 1.7 ± 0.2 in-lb
Torque Tool - 2.0 ± 0.2 in-lb
Torque Tool - 2.5 ± 0.2 in-lb
Torque Tool - 3.0 ± 0.30 in-lb
Torque Tool - 4.0 ± 0.5 in-lb
Torque Tool - 5.0 ± 0.5 in-lb
Torque Tool - 6.5 ± 0.7 in-lb
Torque Tool - 7.0 ± 0.7 in-lb
Torque Tool - 8.0 ± 1.0 in-lb
Torque Tool - 10.0 ± 1.0 in-lb
Torque Tool - 30.0 ± 3.0 in-lb
Torque Tool - 65.0 ± 6.0 in-lb
0.026" Snap Ring Pliers
Needle-Nose Pliers
Wire Cutters
Wire Strippers
Ruler - 6"
Low Wattage Soldering Pencil
Plastic Stylus
Alligator Clip, Small
0.010" Shim
0.030" Shim
Flatblade Screwdriver (small)
Phillips Screwdriver - # 1 (for use with torque tool)
Phillips Screwdriver - # 1 (standard tool)

Required Tool
Torx Driver - T6 (for use with torque tool)
Torx Driver - T6 (standard tool)
Torx Driver - T9 (for use with torque tool)
Torx Driver - T9 (standard tool)
Torx Driver - T10 (for use with torque tool)
Torx Driver - T10 (standard tool)
9/16" Open End Wrench (for use with torque tool)
9/16" Open End Wrench (standard tool)
5.5 mm Nut Driver (for use with torque tool)
5.5 mm Nut Driver (standard tool)
1/4" Nut Driver (for use with torque tool)
1/4" Nut Driver (standard tool)
7/16" Nut Driver (for use with torque tool)
7/16" Nut Driver (standard tool)
7/8" Nut Driver (for use with torque tool)
7/8" Nut Driver (standard tool)
0.7 mm Hex Driver (standard tool)
0.9 mm Hex Driver (standard tool)
1.0 mm Hex Driver (standard tool)
1.5 mm Hex Driver (for use with torque tool)
1.5 mm Hex Driver (standard tool)
2.0 mm Hex Driver (for use with torque tool)
2.0 mm Hex Driver (standard tool)
2.5 mm Hex Driver (for use with torque tool)
2.5 mm Hex Driver (standard tool)
4.5 mm Hex Driver (for use with torque tool)
4.5 mm Hex Driver (standard tool)
Spanner Driver, Insert Bit # 4 (for use with torque tool)
Spanner Driver, Insert Bit # 4 (standard tool)

Table 7-2. Required Tools & Equipment

Consumable Materials

The following consumable items are used where called out in the repair procedures in this section.

Consumable	Use
Small applicator Swabs (foam)	To apply lubricants and adhesives
Loctite 222	Adhesive as required in procedures
Loctite 425	Adhesive as required in procedures
Loctite 454	Adhesive as required in procedures
Loctite 712	Curing accelerant where required
Nyogel 760G	Flex circuit contact preservative (DO NOT USE on the keypad flex circuits or on the Power ON/OFF Switch membrane flex circuits!)
Silicone G501	Lubricant as required in prodecures
Solder	For electrical connections
Ajax Expert Glass & Multi-Surface Cleaner	Touchscreen cleaner
Solvent Cleaner	Loctite adhesive remover
Kapton Tape	To hold down wire harnesses and flex circuits
Double-sided Tape (Thin)	To replace adhesive layer on parts when required
Black Permanent Marker	To mark guiding lines during parts replacement
Syringe (B-D or MONOjECT 60 mL)	As needed
Paper Towels	To wipe up spills or excess lubricants
Soapy Water	To install the circuit board stack and glove

Table 7-3. Consumable Materials

Torque Specifications

Torque requirements for fasteners are provided as needed within the specific replacement procedures in this section. When specific torque requirements are not given, use care to not over tighten those fasteners during assembly.

Repair Flowcharts

Figures 7-1 and 7-2 contain the flowcharts showing the sequence to follow for specific repair procedures.

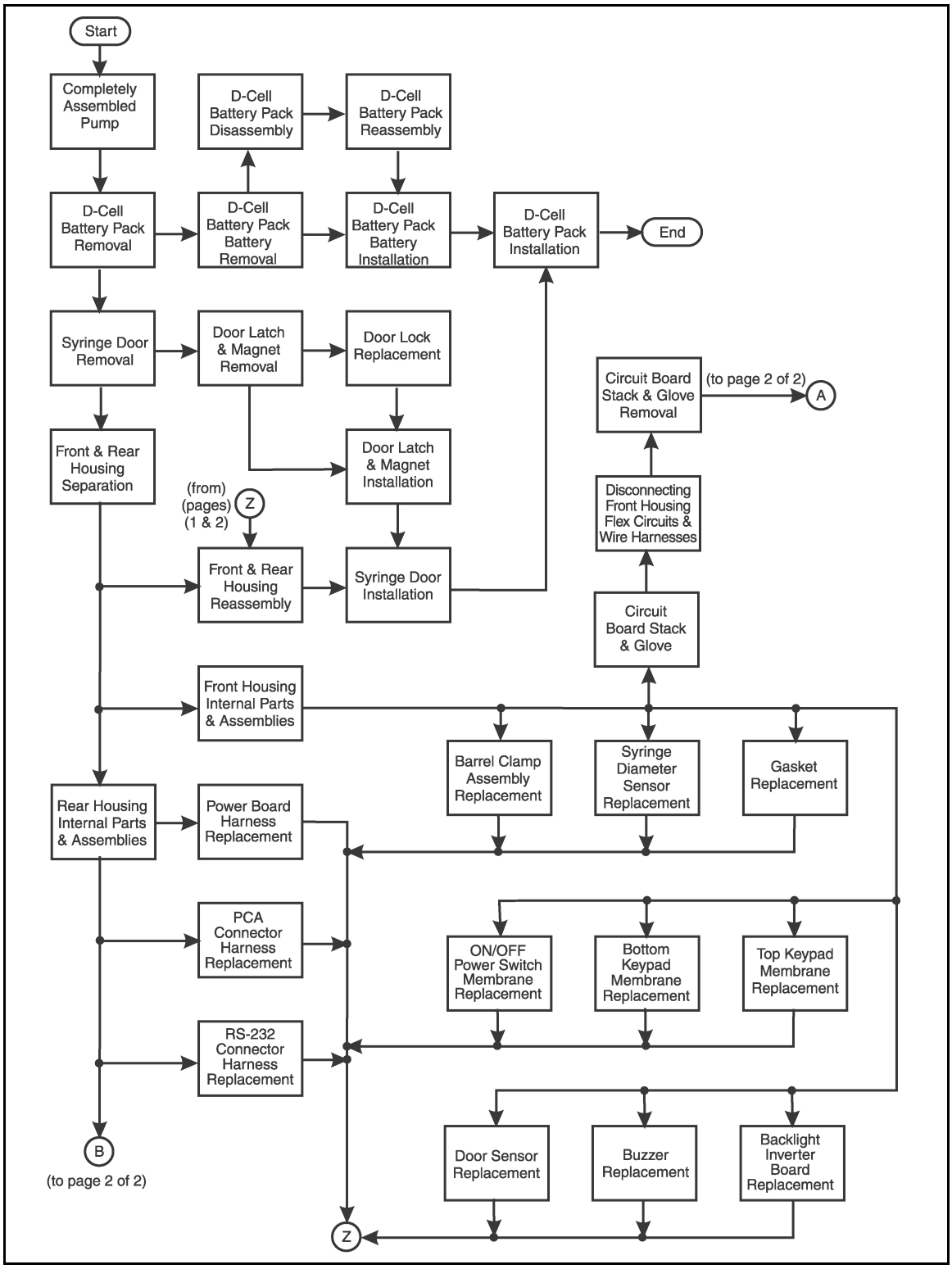


Figure 7-1. Repair Flowchart (page 1 of 2)

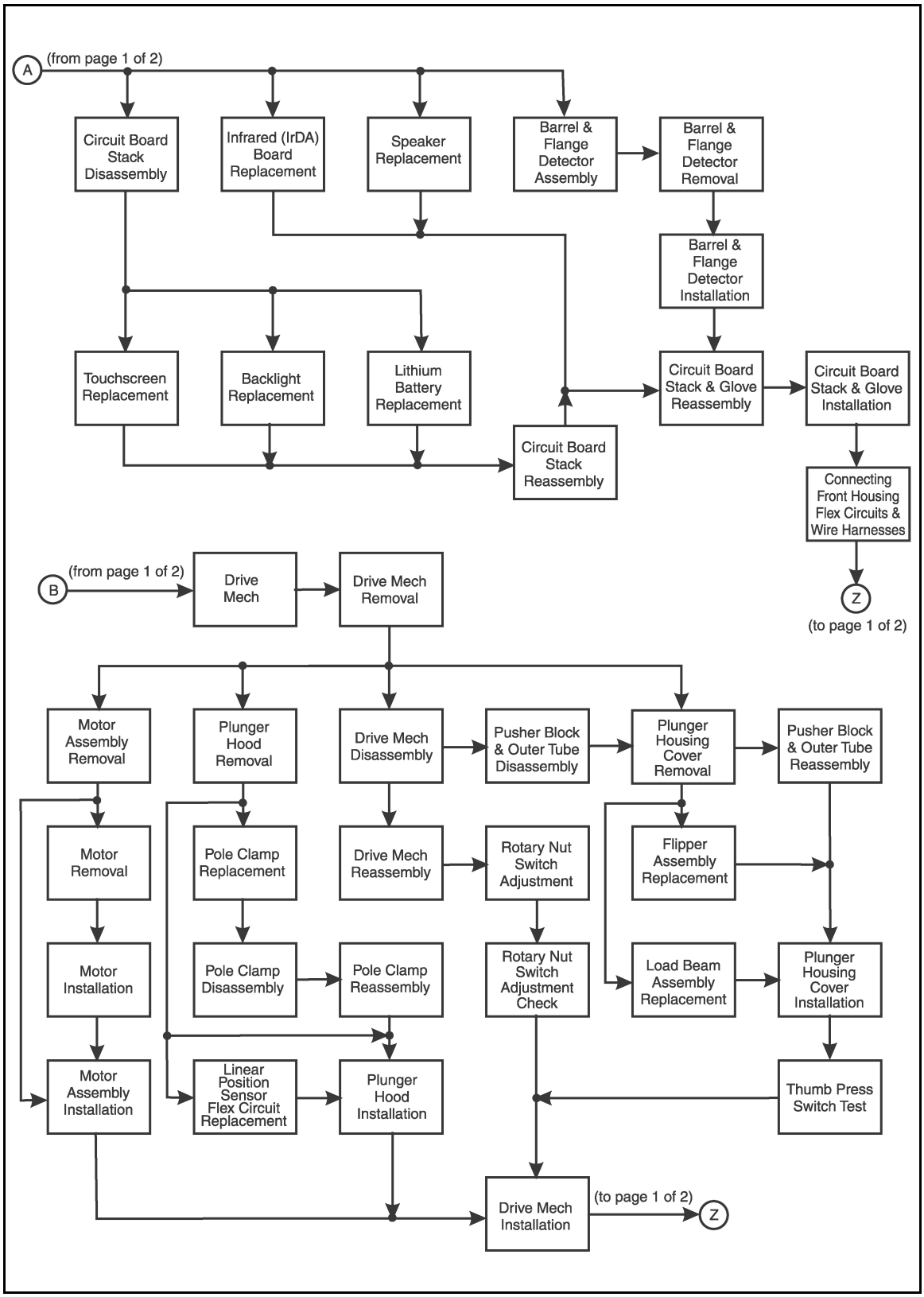


Figure 7-2. Repair Flowchart (page 2 of 2)

D-Cell Battery Pack

D-Cell Battery Pack Removal

The D-cell battery pack contains four replaceable "D" size alkaline batteries which provide power for the pump. The battery pack must be removed from the pump and the battery pack cover opened to access the batteries. If necessary, further battery pack disassembly may be performed to replace damaged or non-working parts. Additional battery packs (without batteries) can be ordered as Baxter part # B089120015.

NOTE: Remove the D-cell battery pack before disassembling the pump. This will reduce the weight and ensure there is no power applied to the pump electronics.

Battery Pack Disassembly & Reassembly

1. Follow the instruction label to open the battery pack and remove the D-cell batteries.
2. Refer to Figure 7-3. Disassemble the battery pack according to the illustration.
3. Remove any worn or broken parts.
4. Reassemble the battery pack, replacing any parts as needed.
5. Use two 1/4" nut drivers to assemble the battery pack standoff to the battery holder harness assembly. Tighten the lock nut to a torque of 10 ± 1.0 in-lb.

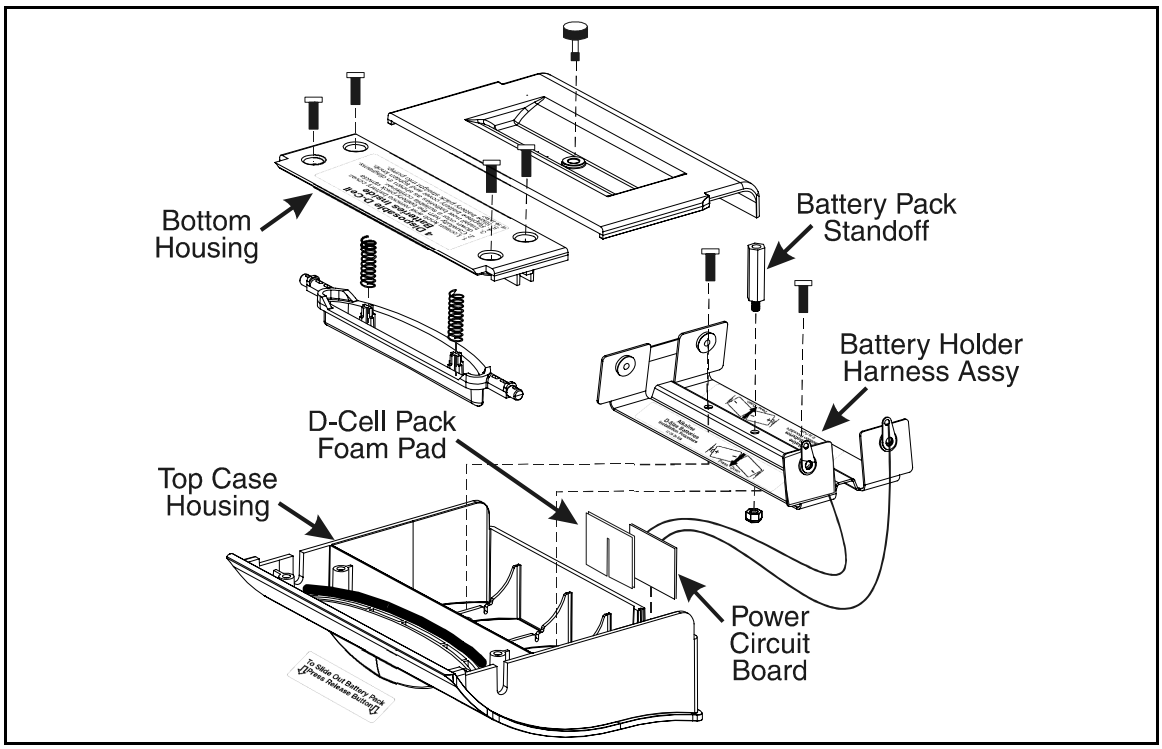


Figure 7-3. D-Cell Battery Pack

6. When replacing the battery holder harness assembly, refer to Figure 7-4. Slide the power circuit board in until the top of the board is below the edge of the housing, then position and dress the wires as shown. (The soldered electrical connectors covered by shrink tubing, located on the outside of the battery holder, must be rotated to face the circuit board. Wires must be secured in the wire slot in the housing.) Use a T-9 Torx

driver to install the two screws that attach the battery holder to the top case housing. Tighten these screws to a torque of 6.5 ± 0.65 in-lb.

7. Refer to Figure 7-4. When replacing the D-cell pack foam pad, remove the adhesive backing and apply the pad to the circuit board as shown.
8. When assembling the bottom housing to the top case housing, use a T-9 Torx driver to install the four screws. Tighten the screws to a torque of 6.5 ± 0.65 in-lb.
9. To complete this procedure, follow the label guidelines to install four Duracell D-cell batteries in the battery pack, and attach the battery pack cover.

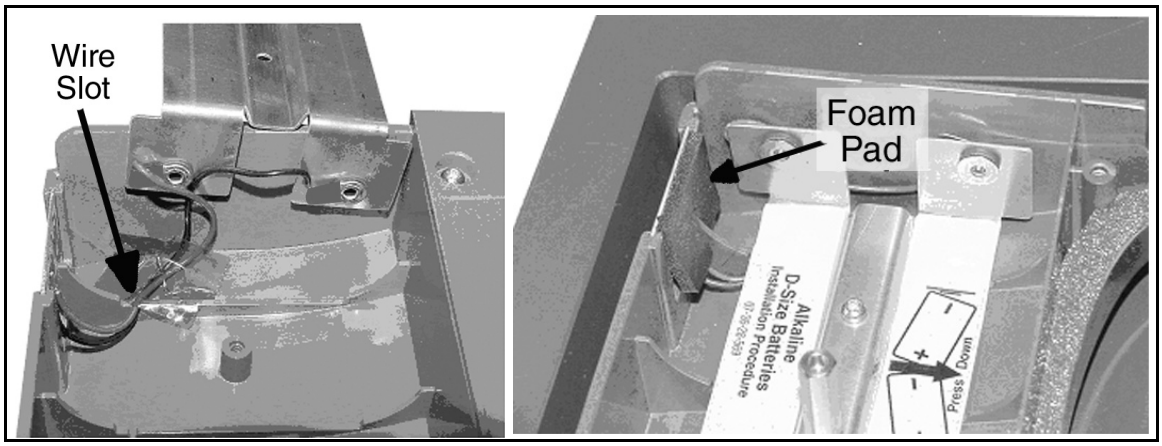


Figure 7-4. D-Cell Battery Holder Harness Assembly

Syringe Door

Syringe Door Replacement

The syringe door assembly must be removed in order to disassemble the pump.

1. Unlock and open the Syringe Door.
2. Refer to Figure 7-5. Use a # 10 Torx driver to loosen (do not remove) the 4 Torx screws that attach the syringe door to the front case half. Once all four screws are loosened, remove the screws and the syringe door from the pump.
3. Align the replacement door with the front housing and use a # 10 Torx driver to install the four mounting screws. Tighten the screws to a torque of 8.0 ± 1.0 in-lb.

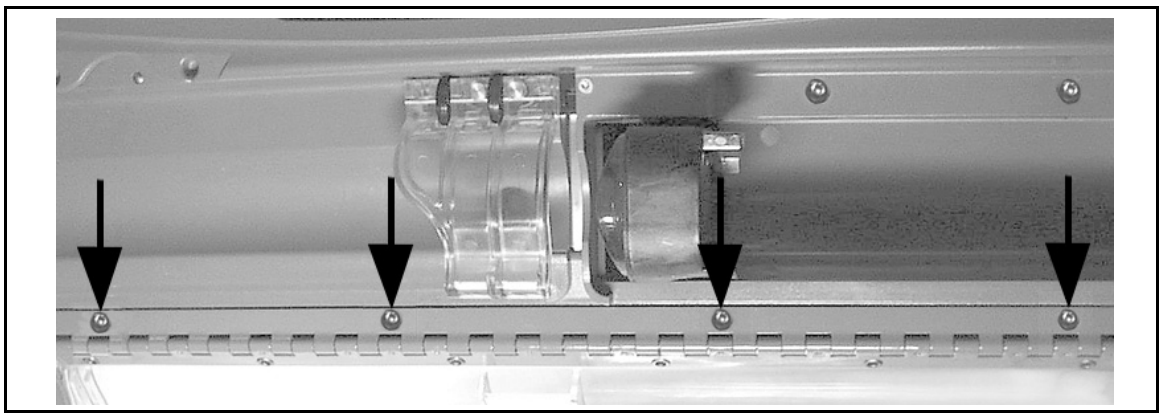
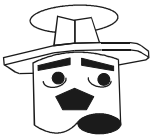


Figure 7-5. Syringe Door Mounting Screws

Door Lock Disassembly & Reassembly



HINT: A syringe door assembly, with the door lock installed, is available from Baxter. Installing a door lock requires the use of assembly fixture
9215001873 to ensure proper positioning of the door lock mechanism. This fixture is not required if only the latch with magnet assembly or just the magnet needs to be replaced.

Door Latch & Magnet Replacement

The door latch and magnet are available as an assembly. The magnet is also available as a separate part.

NOTE: DO NOT remove the door lock assembly if only the door latch or magnet need replacement.

1. Refer to Figure 7-6. While using pliers to hold the door latch, use a 7/16" nut driver to loosen the 9/32" hex nut.
2. Remove the nut, lock washer, and door latch from the door lock mechanism.
3. If the magnet needs to be replaced:
   a. Use a small screwdriver to pry out the magnet seated in the latch, and remove all residual Loctite material from the magnet mounting hole.
   b. Apply one fresh drop of Loctite 454 into the mounting hole, then press a new magnet into the mounting hole.
   c. Use an alligator clip to clamp the magnet in place for at least 5 minutes. (Be sure the clip pressure is on the magnet and not on the surrounding metal.)
4. Refer to Figure 7-6. Install the door latch assembly, lock washer, and 9/32" hex nut.
5. Complete this procedure by using the 7/16" nut driver to tighten the hex nut to a torque of 30.0 ± 3.0 in-lb.

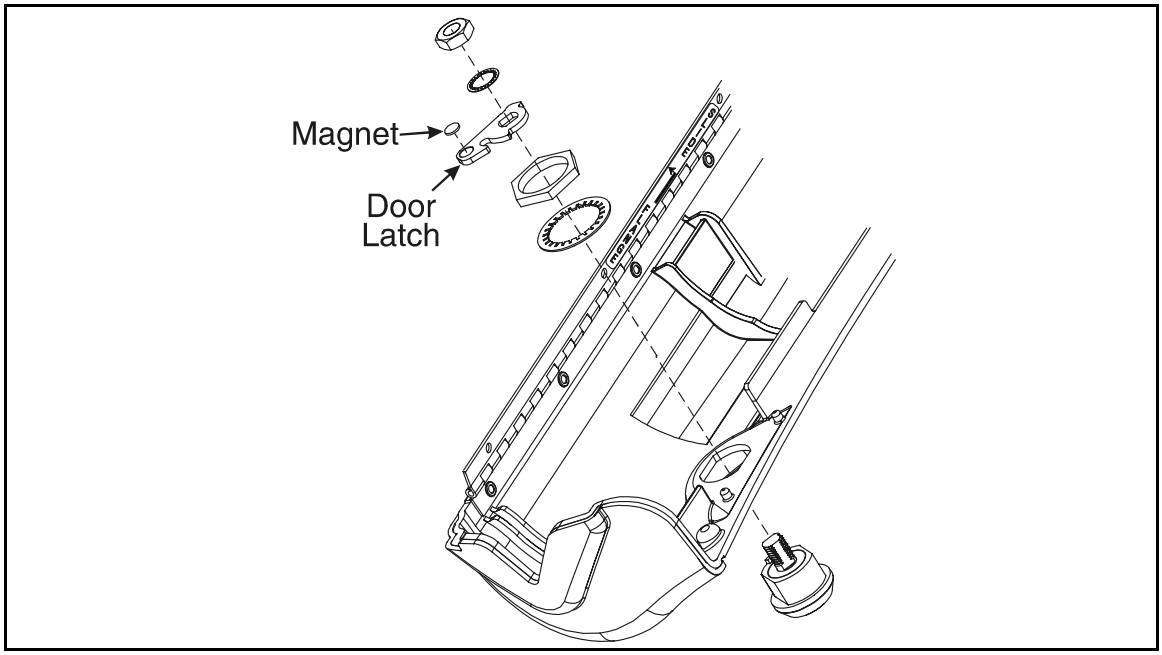


Figure 7-6. Door Lock Replacement

Door Lock Replacement

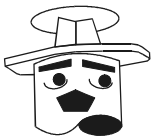
1. Refer to Figure 7-6. Disassemble and remove the parts of the door lock as illustrated.
2. Install the syringe door lock, associated lock washer, and the 3/4" hex nut.
3. Use the door assembly fixture (Baxter part # 921-5001-873) to hold the door and lock in the proper positions, then use a 7/8" nut driver to tighten the 3/4" mounting nut to a torque of 65.0 ± 6.0 in-lb.
4. Perform the Door Latch & Magnet Replacement procedure as described previously.

Pump Housing

CAUTION

DAMAGE TO THE PUMP can occur if the front and rear housings are separated in an incorrect manner. DO NOT physically separate the two housings from each other until instructed to do so in the following procedure.

Internal flex circuits and wire harnesses must be disconnected before the two housing assemblies can be completely separated.



HINT: To ensure proper disassembly in the procedures that follow, always loosen all affected screws before removal.

Front & Rear Housing Separation

1. Remove the Syringe Door Assembly as described previously.
2. Rotate the pole clamp knob counterclockwise until the clamp is fully open.
3. Refer to Figure 7-7. Lay the pump on its face with the handle toward you and use a #10 Torx driver to just loosen (do not remove) the five screws positioned around the perimeter at the back of the pump.

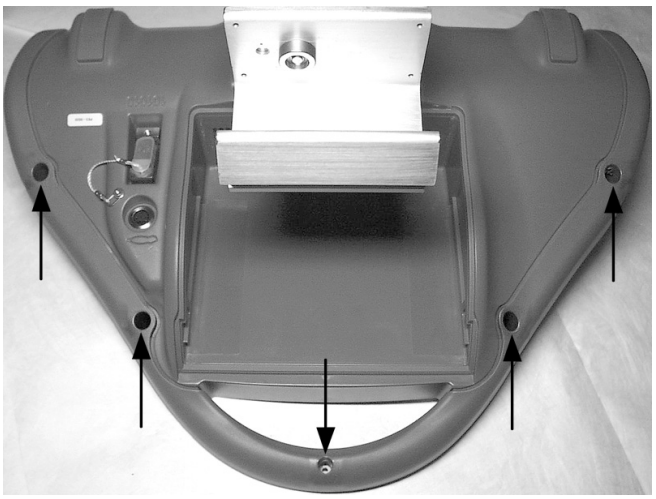


Figure 7-7. Rear Housing Mounting Screws

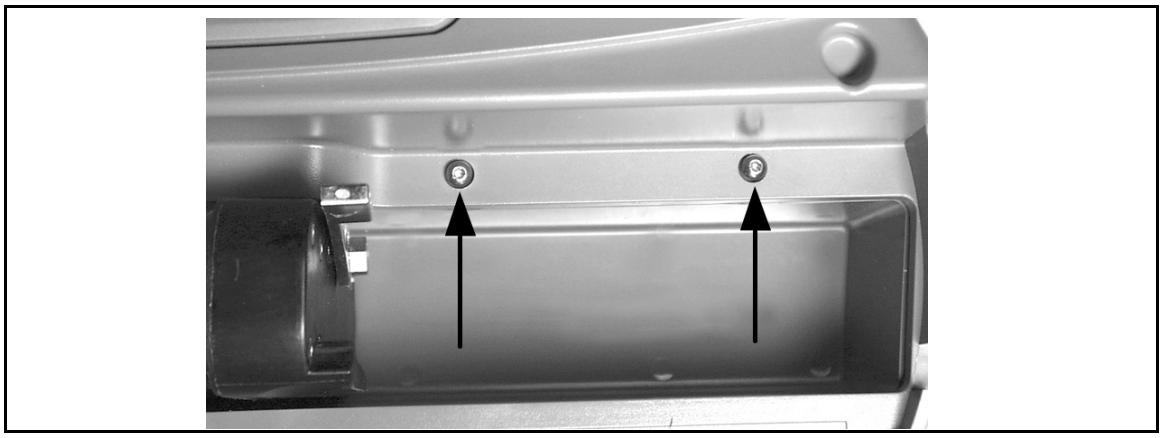


Figure 7-8. Front Housing Mounting Screws

4. Refer to Figure 7-8. Turn the pump over and use a #10 Torx driver to loosen and remove the two mounting screws located near the pusher block assembly.
5. Use a #10 Torx driver to remove the screw located in the center of the logo label on the front of the pump housing.

NOTE: This screw is longer than the other mounting screws and must always be used in this location.

6. Once again lay the pump on its face and remove the five rear housing Torx screws loosened earlier in this procedure.

CAUTION DO NOT lift the rear housing from the pump. Internal flex circuits and wire harnesses must be disconnected before the front and rear housing assemblies can be completely separated from each other.

7. Refer to Figure 7-9. Position the pump on a flat surface with the handle up. Allow the rear housing to rest in a vertical position while carefully tipping the front housing away from it.

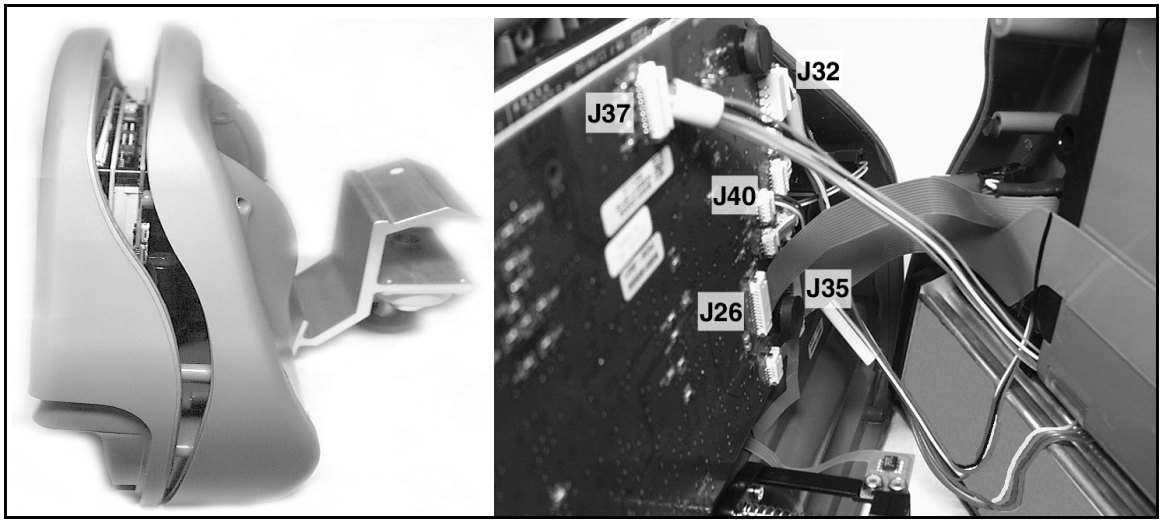


Figure 7-9. Opening The Pump Housing

CAUTION

In the following steps, ensure that the interconnecting flex circuits and wire harness connections are not damaged. Use a plastic stylus to carefully slide the flex circuit clamping tabs out from the connectors. This reduces the clamp pressure and eases flex circuit removal.

8. Hold onto the front housing while disconnecting the cables between the two housings.

NOTE: Flex circuits and wire harnesses from the rear housing must be disconnected from the interface board inside the front housing.

9. Refer to Figure 7-9. Disconnect the flex circuits at J26 and J35 and the wire harnesses at J32, J37, and J40.

10. Complete this procedure by separating the front and rear housings.

Front & Rear Housing Reassembly

Before reassembly, be sure all connections are properly seated on both the front housing assembly and the rear housing assembly. Be sure all internal parts and mounting hardware are accounted for.

1. Refer to Figure 7-10. In the front housing assembly, ensure that the three large screw cap pads and one small screw cap pad are properly positioned on the four stack screw caps. (If necessary, apply thin double-sided tape between the screw cap and the pad.)

2. Refer to Figure 7-10. In the rear housing assembly, check that the small screw cap pad is properly positioned on the mounting post. (If necessary, apply thin double-sided tape between the mounting post and the pad.)

3. Before connecting the two flex circuits from the rear housing to the interface board, apply a light coating of Nyogel 760G preservative to the bare contacts.

4. Refer to Figure 7-9. Position the rear housing assembly on a flat surface with the handle up as shown.

5. Position the front housing directly in front of the rear housing in a position where access to the interconnecting cables is available.

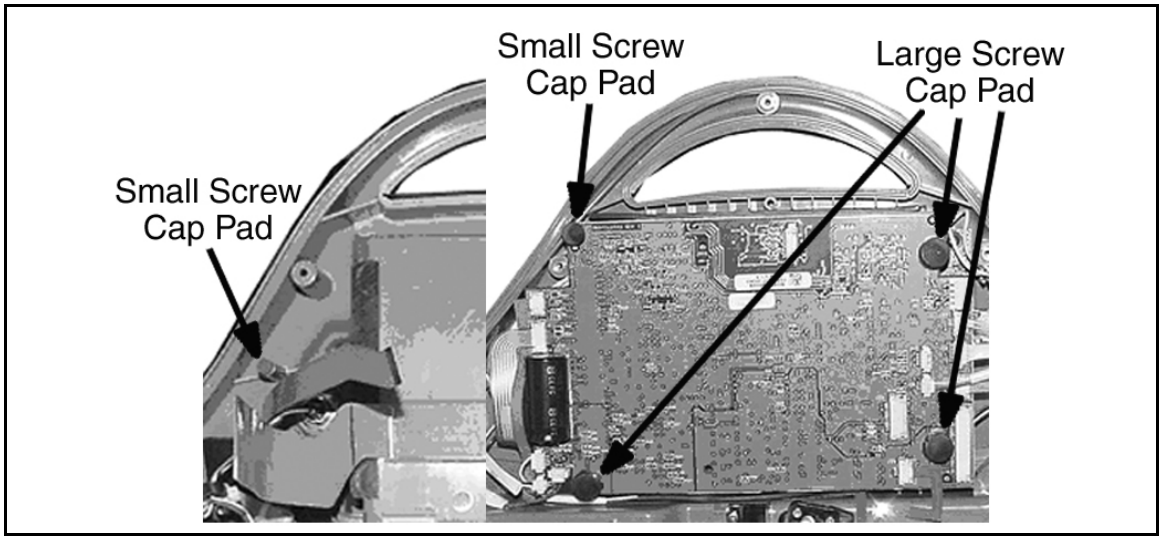
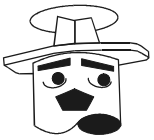


Figure 7-10. Rear and Front Housing Pad Locations

6. Refer to Figure 7-9 and Table 7-4. While holding the front housing, locate and insert the wire harnesses and flex circuits into the connectors on the interface board.



HINT: Be sure to open the clamps on the flex circuit connectors, and press them closed after the flex circuit has been inserted.

Connector	Description
J26	Motor & Rotary Switch Flex Circuit
J32	Power Circuit Board Wire Harness
J35	Linear Position Sensor Flex Circuit
J37	RS-232 Ferrite Ring Harness (connect this last as the housings are closed together)
J40	PCA Ferrite Ring Harness

Table 7-4. Wire Harness & Flex Circuit Connectors

NOTE: In the next step, be sure no flex circuits or wire harnesses are positioned over the backlight inverter board or pinched between the stack screw cap pads and the rear housing.

7. Refer to Figure 7-11. Observe all flex circuit connections and ensure that they are correctly inserted as shown. (When fully inserted, the tinned leads should not be visible!)

8. Being careful not to pinch or damage any flex circuits or wire harnesses, connect the RS-232 harness to J37 on the interface board and close both housings together.

CAUTION In the following steps, only use the longer mounting screw in the hole located in the center of the logo label. Use of this screw in any other location can damage the housing.

9. Refer to Figure 7-7. Carefully place the pump on its front housing as shown, then use a # 10 Torx driver to install the five mounting screws (do not completely tighten).

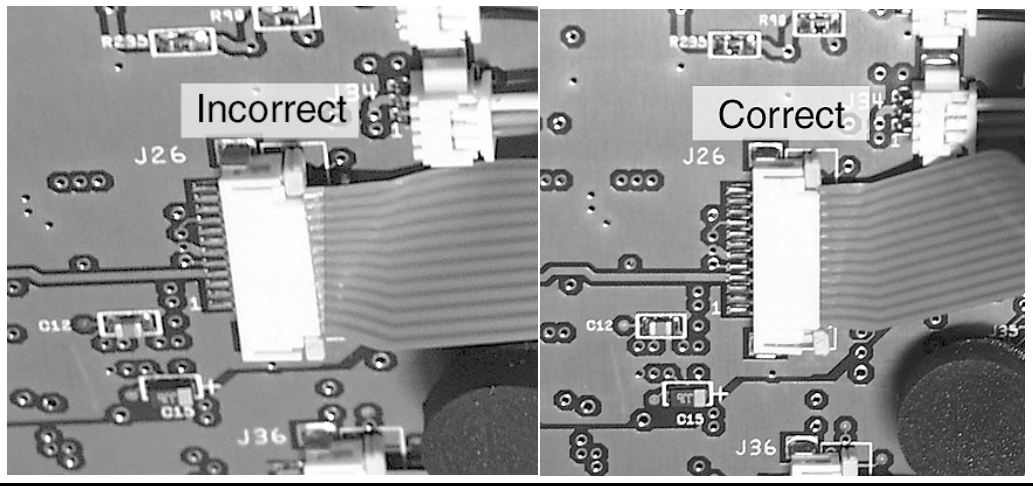


Figure 7-11. Flex Circuit Connections

10. Turn the pump over and insert the longer mounting screw in the hole located in the center of the logo label, and with a # 10 Torx driver, turn it to ensure proper thread alignment (do not completely tighten).
11. Refer to Figure 7-8. Insert the two mounting screws near the pusher block assembly, and with a # 10 Torx driver, turn each one to ensure proper thread alignment (do not completely tighten).
12. Insert the four remaining mounting screws though the syringe door assembly into the front housing, and with a # 10 Torx driver, tighten them to a torque of 8.0 ± 1.0 in-lb.
13. Return to the two screws near the pusher block and the one in the center of the logo label and tighten them to a torque of 8.0 ± 1.0 in-lb.
14. Complete this procedure by returning to the five screws at the rear of the pump and tightening them to a torque of 8.0 ± 1.0 in-lb.

RS-232 Connector Check

The RS-232 wire harness is the last item connected to the interface board during pump assembly. This test ensures the connection did not come lose during the process. If this test does not pass, disassembly of the pump will be required.

1. Connect an ohmmeter across pins 5 and 8 on the DB9 connector at the rear or the pump.
2. A reading of 1K ohms indicates that the RS-232 wire harness is connected properly.

Pump Calibration & Verification Requirements

Refer to Table 7-5. After reassembly, specific calibration and verification procedures are required depending on the parts and assemblies replaced. Once the pump is reassembled, refer to Section 6 to perform the required calibration and verification procedures.

Part/Assembly Disassembled or Replaced	Calibration & Verification Required
Interface Board	All Calibration/Verification Procedures.
Global Brain Board	All Calibration/Verification Procedures.
Circuit Board Stack	All Calibration/Verification Procedures.
Touchscreen or LCD/touchscreen Assembly	Touchscreen Calibration/Verification.
Syringe Diameter Sensor	Syringe Diameter Sensor Calibration/Verification.
Barrel Clamp Assembly	Syringe Diameter Sensor Calibration/Verification.
Drive Mech Assembly or any Drive Mech parts	Linear Position Sensor & Occlusion Sensor Calibration/ Verification.
Plunger Housing or any internal Plunger Housing parts (Load Beam Assy, Flipper Assy)	Linear Position Sensor & Occlusion Sensor Calibration/ Verification.
Pusher Block & Outer Tube Assembly	Linear Position Sensor & Occlusion Sensor Calibration/ Verification.
Plunger Hood	Linear Position Sensor & Occlusion Sensor Calibration/ Verification.
Linear Position Sensor	Linear Position Sensor & Occlusion Sensor Calibration/ Verification.

Table 7-5. Pump Calibration Requirements

Front Housing Internal Parts & Assemblies

Once the front and rear housings have been separated, the following procedures will assist in the replacement of parts and assemblies located inside the front housing.

Gasket Replacement

There are three gaskets used in the pump to prevent fluid ingress. If these are damaged, all three gaskets are available as a kit.

1. Refer to Figure 7-12. Remove the gasket requiring replacement.
2. Starting at the position shown, press the gasket material into the groove along the edge of the housing. DO NOT stretch or pull on the gasket material during installation.
3. When the end of the gasket is reached, retrace the path and ensure the gasket material is positioned properly in the groove.
4. Complete this procedure by cutting the gasket material to ensure a snug fit.

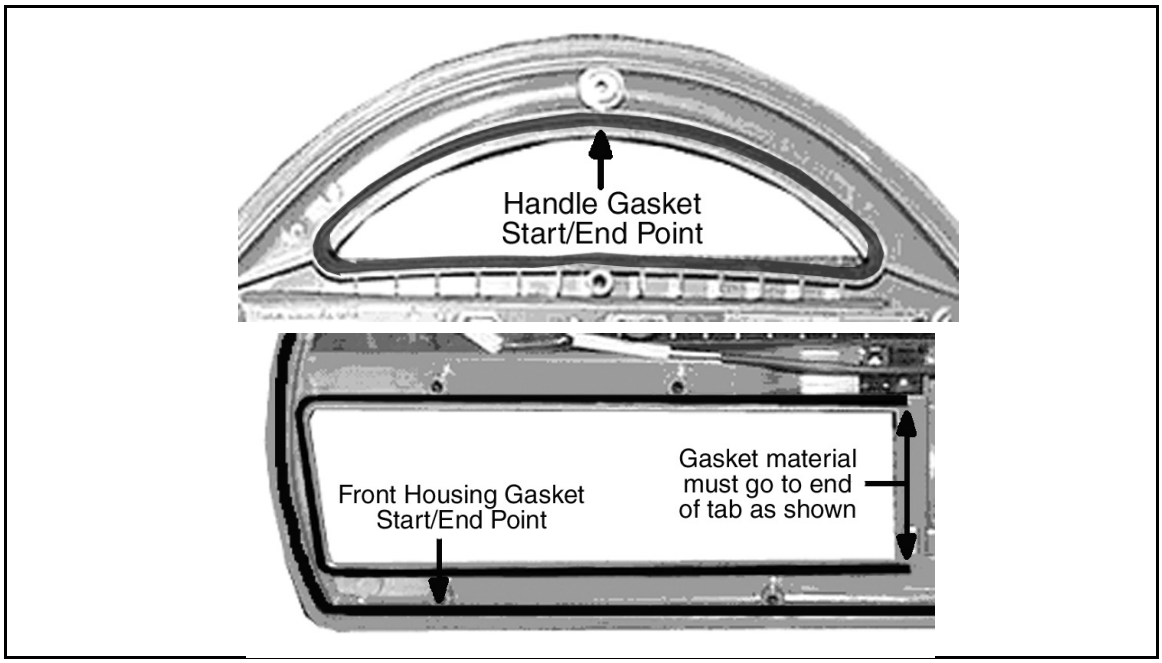
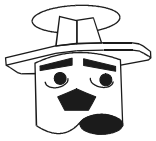


Figure 7-12. Gasket Replacement

Circuit Board Stack & Glove



HINT: A front assembly, with all the parts and inner assemblies installed, is available from Baxter. In this procedure, installing the circuit board stack and rubber glove into the front housing requires the use of an assembly fixture (Baxter part # 9215000458).

The circuit board stack is mounted within a rubber "glove" that provides shock protection for the circuit board stack as well as creating a barrier against fluid ingress.

The circuit board stack is made up of three assemblies. At the bottom of the stack is the liquid crystal display (LCD) with a replaceable backlight and an attached touchscreen.

The second layer is the global brain board, and the top layer (the one with all the cables connected to it) is the interface board.

The board stack is available as a complete assembly. However, each of the three layers in the stack can be replaced individually. This procedure describes the removal and replacement of the board stack as a whole. Further board stack disassembly is presented in additional procedures that follow later in this section.

CAUTION If the pump's circuit board stack is replaced with a new stack or if either the interface board or the global brain board is replaced, the complete calibration procedure provided in Section 6 must be performed.

Circuit Board Stack & Glove Removal

CAUTION Before removing any flex circuits from the circuit board connectors, use a plastic stylus to carefully slide the flex circuit clamping tabs out from the connectors. This reduces the clamp pressure and eases flex circuit removal.

1. Refer to Figure 7-13. Disconnect all flex circuits and wire harnesses connected to the interface board and the backlight harness connector from the backlight inverter board.

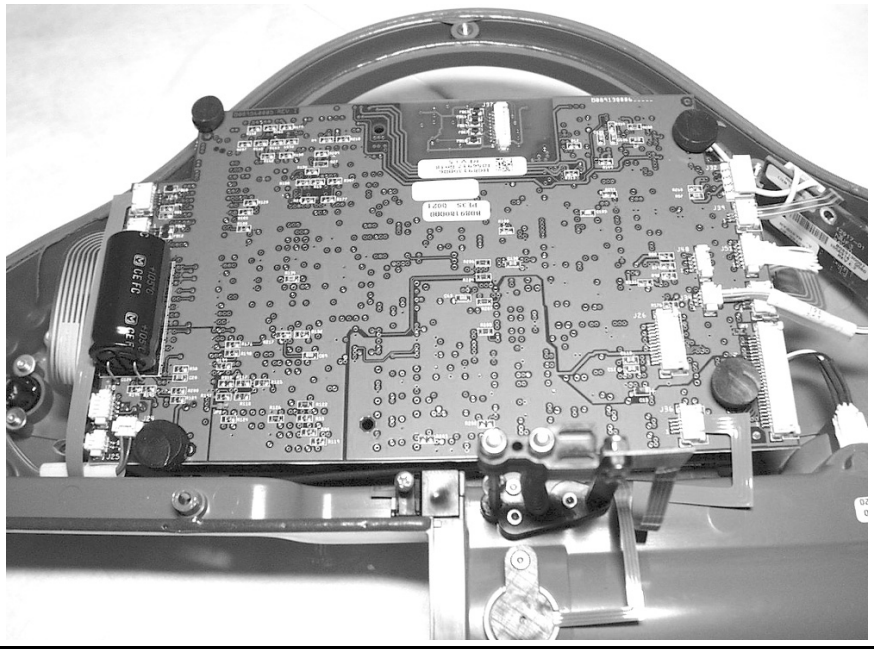


Figure 7-13. Board Stack Interface Board Connectors

CAUTION Both the circuit board stack and the glove must be removed. The glove material will not accept a lot of stretching. As the stack assembly and glove are removed from the housing, use care to ensure the glove is not torn or damaged. The glove may be removed with the stack or separately after the stack is removed.

2. Refer to Figure 7-14. To remove the circuit board stack and glove, use your fingers to carefully raise the assembly at the two corners closest to the pump handle.
3. Complete this procedure by carefully removing the glove from the circuit board stack assembly.

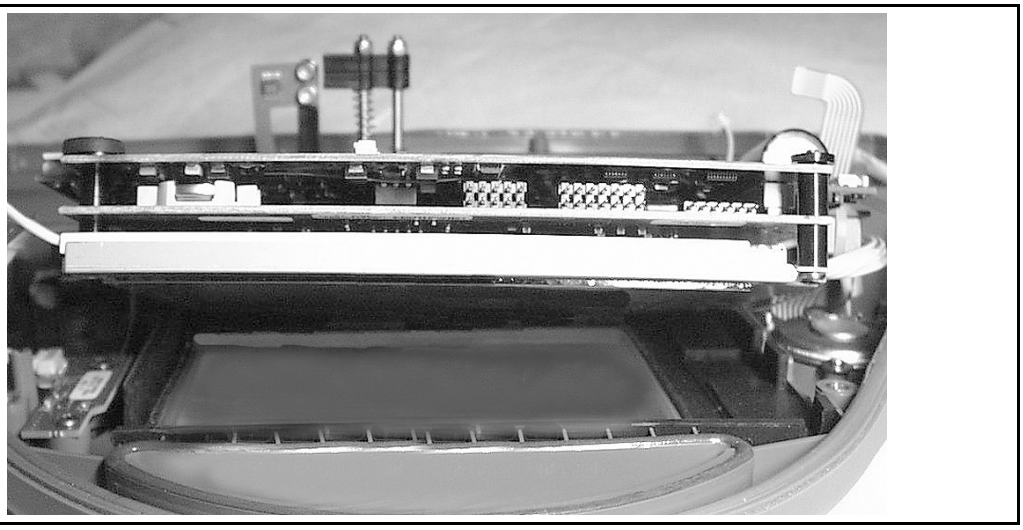
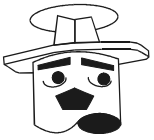


Figure 7-14. Board Stack Removal

Circuit Board Stack & Glove Reassembly

CAUTION The positioning of the circuit board stack in the rubber glove, and the placement of this assembly into the front housing, is very critical to meeting the pump's fluid ingress requirements.



HINT: This procedure requires the use of assembly fixture # 9215000458 to install the circuit board stack into the rubber glove.

1. Use water to carefully clean the glove's inner and outer surfaces, and allow it to dry.
2. Remove any dust and dirt particles from the rubber glove assembly fixture.
3. Refer to Figure 7-15. Position the rubber glove on the fixture as shown.
4. Check that the touchscreen flex circuit is connected to J3 on the interface board.
5. Check to ensure that the LCD display harness is fully seated at both J3 on the global brain board and at the display connector on the LCD assembly.
6. Refer to Figure 7-16. Note the orientation, then place the circuit board stack into the glove on the fixture.
7. Press firmly on the four screw caps to make sure the stack is fully seated into the glove.
8. Complete this procedure by removing the glove and stack from the fixture and visually verifying that the stack is fully seated into the glove.

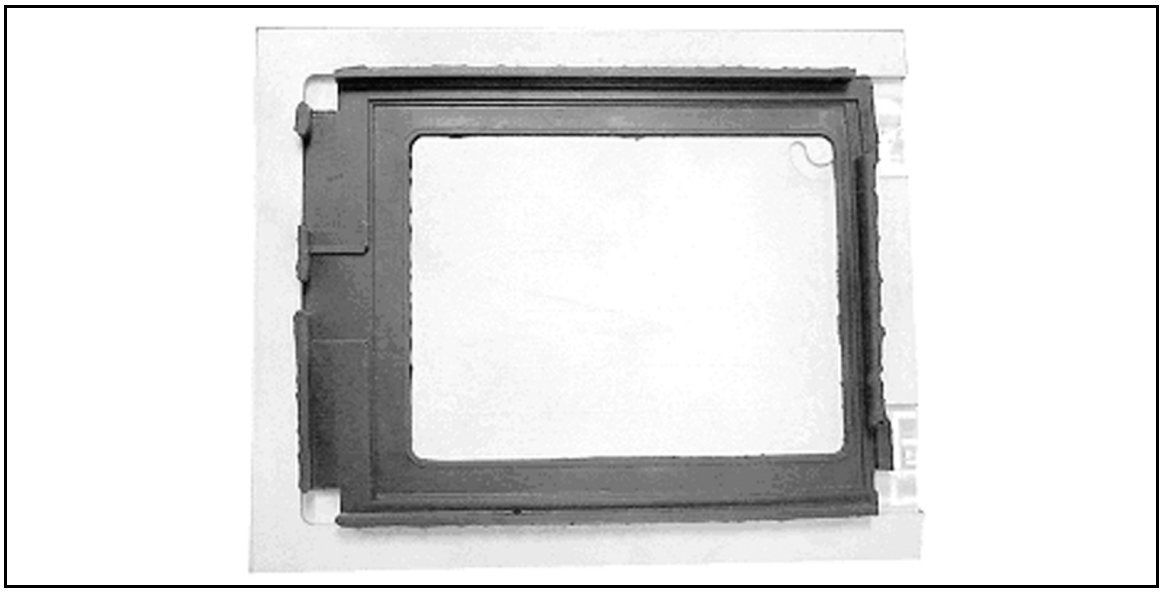


Figure 7-15. Rubber Glove In Fixture

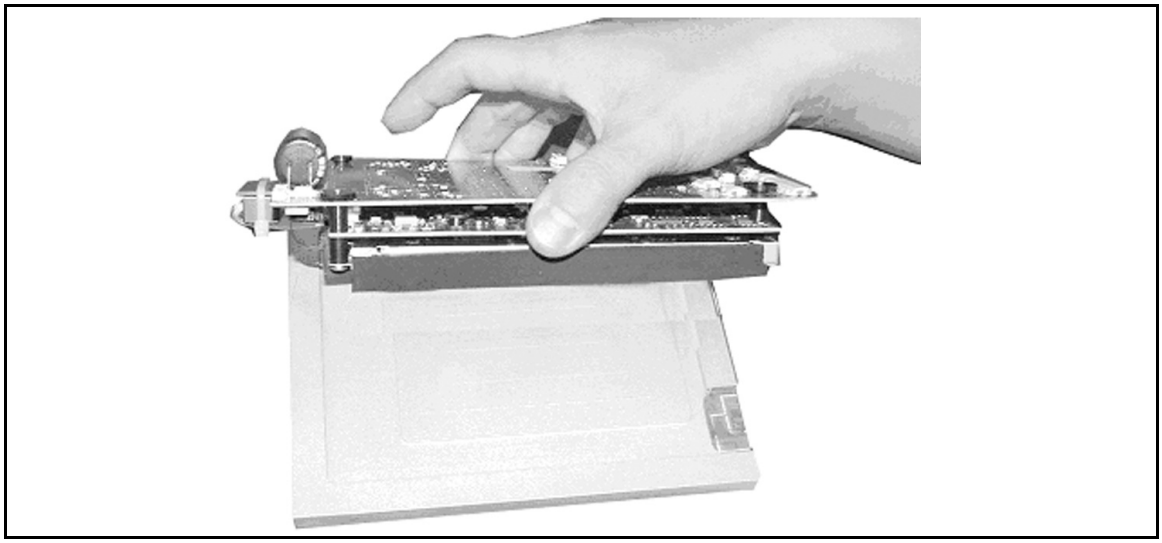


Figure 7-16. Circuit Board Stack And Glove Assembly

Circuit Board Stack & Glove Installation

1. Refer to Figure 7-17. Use a foam applicator to apply a light coating of soapy water around the outer edge of the glove. This permits easier positioning of the glove and stack assembly into the front housing.
2. Refer to Figure 7-18. Place the glove and stack assembly into the front housing as shown. Take care to keep wire harnesses and flex circuits from under the assembly.
3. Place the front housing on a flat surface and press firmly on the four screw caps in the corners of the assembly to ensure a tight fit of the glove into the housing.
4. Check the front of the pump to ensure a tight fit of the glove and the front housing.
5. Let the assembly stand for approximately 10 minutes to allow the soapy water to evaporate.

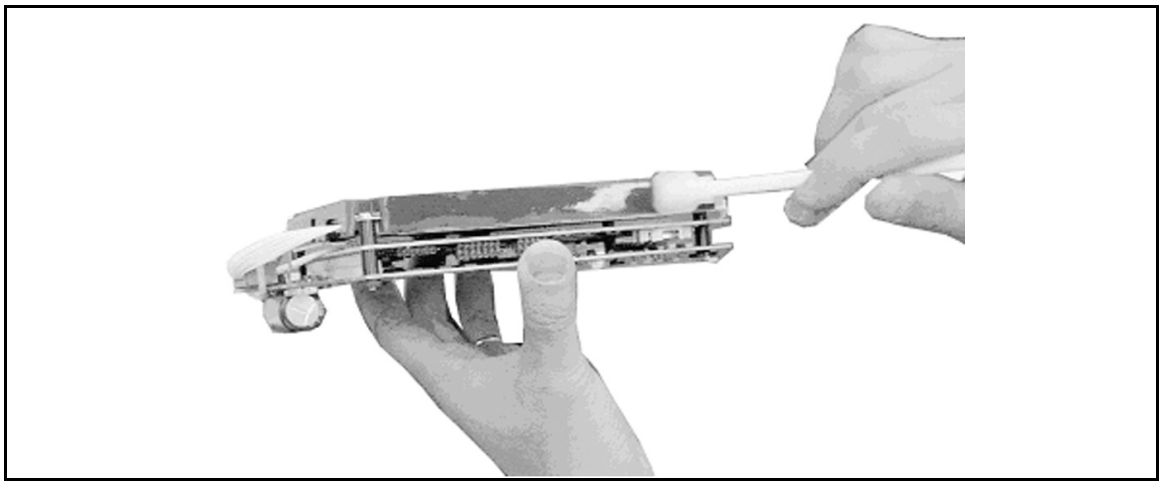


Figure 7-17. Preparing Board Stack And Glove

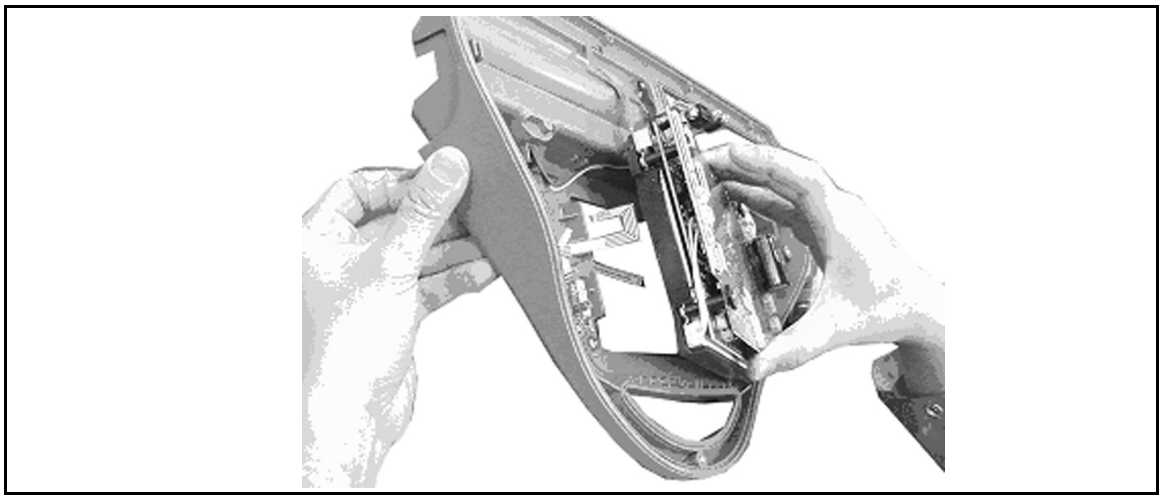


Figure 7-18. Board Stack Glove and Fixture

6. To complete this procedure, turn the front housing over and examine the inner edge of the display bezel to ensure there are no areas where moisture can enter the housing.

Front Housing Flex Circuit & Wire Harness Connections

CAUTION

Before installing any flex circuits into the circuit board connectors, use a plastic stylus to carefully slide the flex circuit clamping tabs out from the connectors. This reduces the clamp pressure and eases flex circuit insertion. Once the flex circuits are properly positioned in the connectors, press the clamping tabs closed to hold the flex circuit in position.

1. Before connecting the flex circuits to the interface board, apply a light coating of Nyogel 760G preservative to the bare contacts. (DO NOT use Nyogel 760G preservative on the keypad flex circuits or on the Power ON/OFF Switch membrane flex circuit!)
2. Refer to Table 7-6 and Figure 7-11. Locate and insert the indicated wire harnesses and flex circuits into the connectors on the interface board.

Connector	Description
J24	Buzzer Harness
J25	Speaker Harness
J28	Door Sensor Harness
J29	Flange Detector Flex Circuit
J30	Top Keypad Membrane Flex Circuit
J31	Bottom Keypad Membrane Flex Circuit
J36	Barrel Clamp Flex Circuit
J51	IrDA Harness

Table 7-6. Wire Harness & Flex Circuit Connectors

3. Be sure the Power ON/OFF Switch flex circuit is properly positioned between the backlight inverter board and the housing, then connect the LCD backlight connector to J1 on the backlight inverter board.
4. Connect the backlight inverter harness between J2 on the backlight inverter board and J34 on the interface board.
5. Position the Power ON/OFF Switch flex circuit over the backlight inverter board to J39 on the interface board.
6. Complete this procedure by verifying that all cables are terminated properly and that all connectors are fully seated.

Circuit Board Stack Disassembly

The circuit board stack is replaceable as a complete assembly. If further disassembly of the board stack is required, follow the instructions that follow.

Circuit board stack disassembly may be required to replace the global brain board, the interface board, the LCD with backlight and touchscreen assembly, or to replace the Lithium Battery located on the global brain board.

NOTE: All memory devices are located on the global brain board. If this circuit board is replaced, all pump settings must be re-entered into memory. The pump must be treated like a newly received device. See the *Syndeo PCA Syringe Pump Configuration Guide* for the appropriate set-up procedures. In addition, remember to use the Pump Info feature of the Service Mode to enter the pump serial number.

In the following steps, ensure that the touchscreen flex circuit and the wire harness connections are not damaged.

CAUTION

Use a plastic stylus to slide the flex circuit clamping tabs out from the connectors. This reduces the clamp pressure and eases flex circuit removal.

CAUTION

The global brain and interface boards are held together only by the 200-pin mating connectors. In the following steps, use care to ensure that this connection is not stressed.

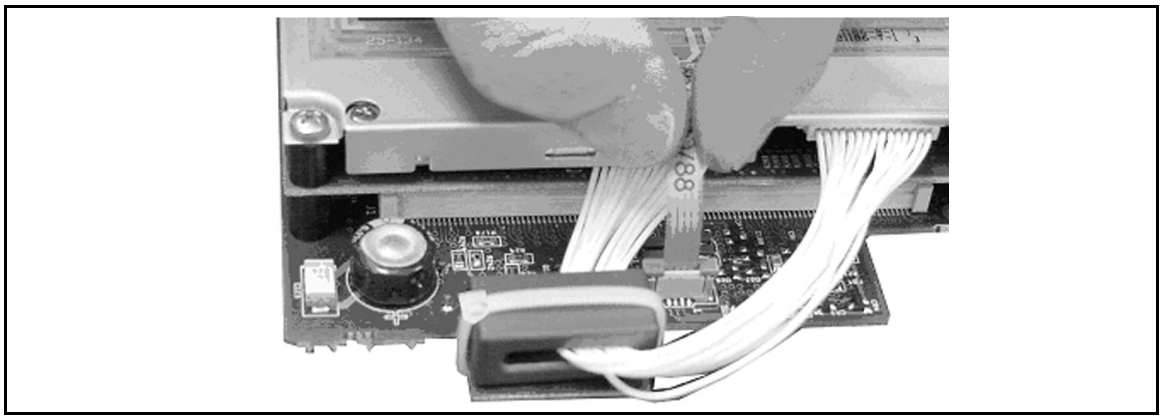


Figure 7-19. Ferrite, Touchscreen Flex Circuit, & Display Wire Harness Locations

1. Refer to Figure 7-19. Disconnect the touchscreen flex circuit at J3 on the global brain board.
2. Slide the cable tie off of the ferrite and the interface board.
3. The ferrite is mounted to the interface board with double sided tape. Carefully remove the ferrite from the tape.
4. Disconnect the LCD display harness from the connector on the LCD.
5. Refer to Figure 7-21. Loosen (DO NOT remove) the four screws and screw caps that hold the circuit board stack together.
6. Taking care not to scratch the touchscreen, place the circuit board stack on a flat surface with the LCD/touchscreen assembly facing down.
7. Hold each of the four screws as you unscrew and remove the three large screw caps and one small screw cap.
8. While holding the edges of the interface and global brain boards near the 200-pin mating connectors, carefully apply finger pressure between the boards to disconnect the connectors, then lift the interface board away from the circuit board stack.
9. Remove four standoffs and remove the global brain board with the still connected LCD display harness.
10. Complete this procedure by removing the standoffs and screws from the LCD/touchscreen assembly.

Circuit Board Stack Reassembly

CAUTION If the pump's circuit board stack is replaced with a new stack or if either the interface board or the global brain board is replaced, the complete calibration procedure provided in Section 6 must be performed.

The following procedure should be performed in a static free environment. An alignment fixture (Baxter part # 9215001835) is available to assist with the assembly of the circuit board stack.

1. Refer to Figure 7-20. Connect the display harness to both the LCD and global brain board as shown.

2. Refer to Figure 7-21. Place the LCD face down, and insert two screws up through the two LCD mounting holes.
3. Place one of the standoffs onto each of the two screws.
4. Fold the global brain board over the LCD and verify that the display harness connectors are fully seated.
5. Place the global brain board onto the two standoffs, then install the two additional mounting screws and standoffs into the slots on the opposite end of the LCD and global brain board.
6. Place four additional standoffs onto the screws on top of the global brain board.
7. While holding the circuit boards by the edges, make sure that the 200-pin mating connectors on both boards are aligned, and lower the interface board down onto the global brain board.
8. Ensure the 200-pin mating connectors are fully seated with each other.

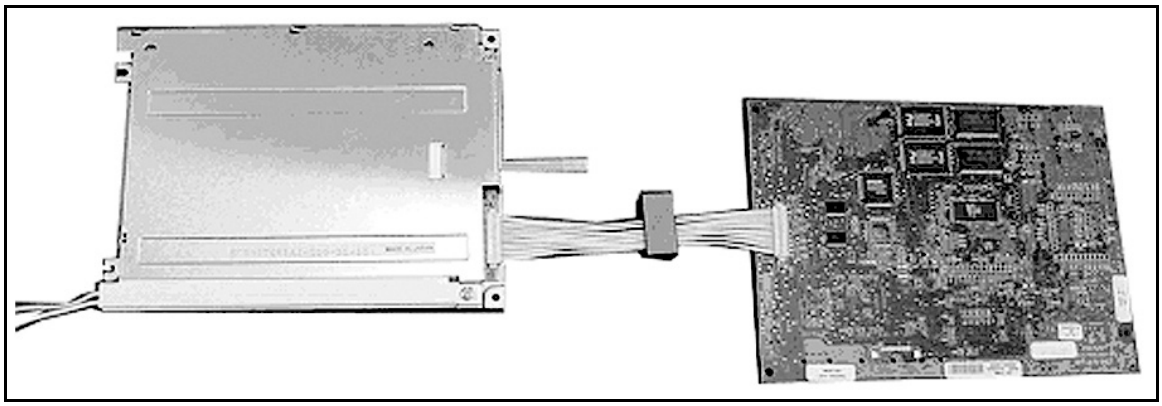


Figure 7-20. LCD & Global Brain Board Assembly

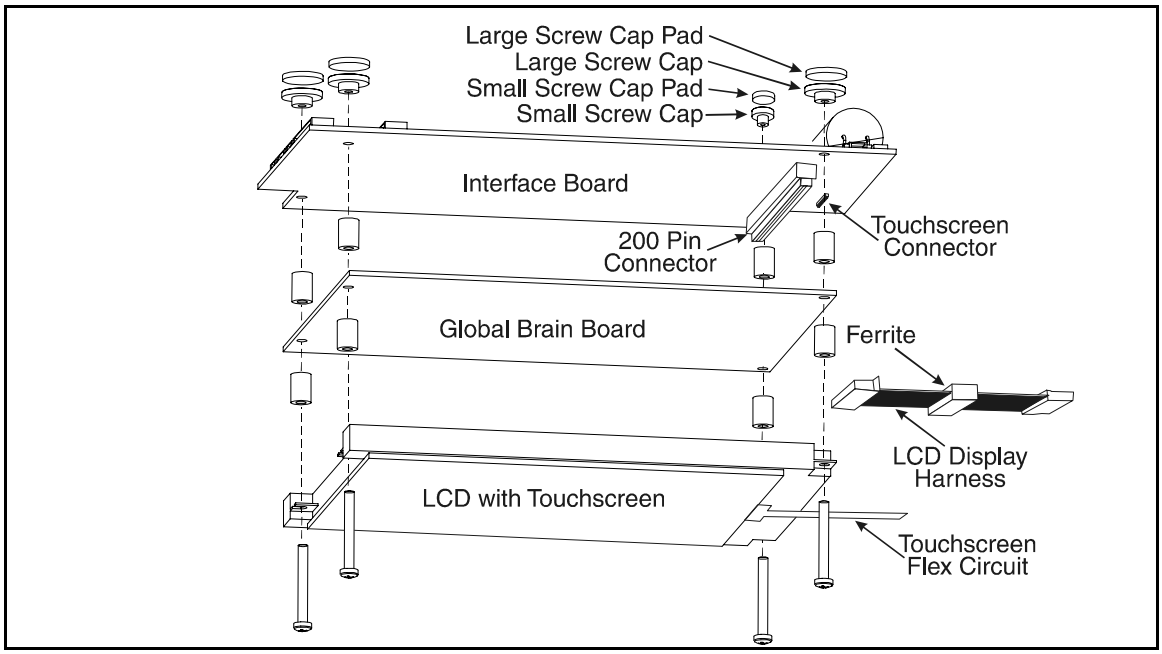
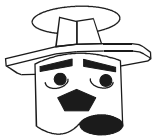


Figure 7-21. Board Stack Disassembly

NOTE: In the following step, the single small screw cap goes on the screw closest to the display harness connector on the LCD assembly.

9. Refer to Figure 7-21. Install the three large screw caps onto three of the mounting screws and the small screw cap onto the fourth.
10. Tighten the four screws and the screw caps. (Do not over tighten; there is no torque requirement for these screws.)
11. Refer to Figure 7-19. Place double-sided tape in position on the ferrite, mount it in position on the interface board extension, then secure it in place with a tie wrap. (NOTE: When tightened in place, the tie wrap "knuckle" must be positioned as shown.)
12. Apply a light coating of Nyogel 760G preservative to the bare contacts of the touch-screen flex circuit.



HINT: In the following step, be sure to open the clamp on the flex circuit connector, and press it closed once the flex circuit has been inserted.

13. Complete this procedure by inserting the touchscreen flex circuit into connector J3 on the interface board.

Backlight Replacement

The backlight module is part of the liquid crystal display assembly. It is also available as a stand-alone part.

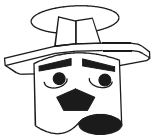
1. Refer to Figure 7-22. Remove the screw at the left end of the backlight module.
2. Raise the left end of the module and slide it to the left to disengage the mounting clip on the right end.
3. Insert the right end of the replacement backlight module under the mounting clip, then lower the module into position.
4. Complete this procedure by inserting the mounting screw and tightening.

Figure 7-22. Backlight Replacement

Touchscreen Replacement

The LCD module (with backlight) and the touchscreen are available as an assembly. If only the touchscreen needs to be replaced, it is available as a separate item. The position of the

touchscreen is critical. A misalignment could cause the touchscreen not to work properly after the pump is reassembled.



HINT: This procedure requires the use of an assembly fixture (Baxter part # 921-5000-471) to properly align the touchscreen on the LCD.

NOTE: The touchscreen consists of a plastic layer glued to a piece of clear glass. Care must be taken when working with this part to avoid chipping or cracking the glass.

1. The back of the touchscreen has an adhesive layer near the perimeter which adheres to the surface of the LCD. One corner of the touchscreen is positioned over an indention in the LCD housing. Position the end of a thin sturdy plastic (or metal) tool under this corner and gently pry up the edge of the touchscreen.
2. Work the tool around the perimeter and lift the touchscreen away from the LCD.
3. Clean off any residual adhesive and dirt from the face of the LCD.
4. Refer to Figure 7-23. Position the L-shaped display alignment fixture on the LCD so that the inside edge overlaps the edge of the LCD.
5. Remove the protective covering from the adhesive (glass) side of the touchscreen.
6. Refer to Figure 7-23. Hold the touchscreen with the glass side down and the flex circuit to the left and carefully align it with the edges of the alignment fixture as shown.
7. Carefully press down along the perimeter of the touchscreen to set the adhesive in place.
8. Complete this procedure by removing the alignment fixture.

CAUTION If the pump's touchscreen or the LCD/touchscreen assembly is replaced, the touchscreen calibration and verification procedure provided in Section 6 must be performed.

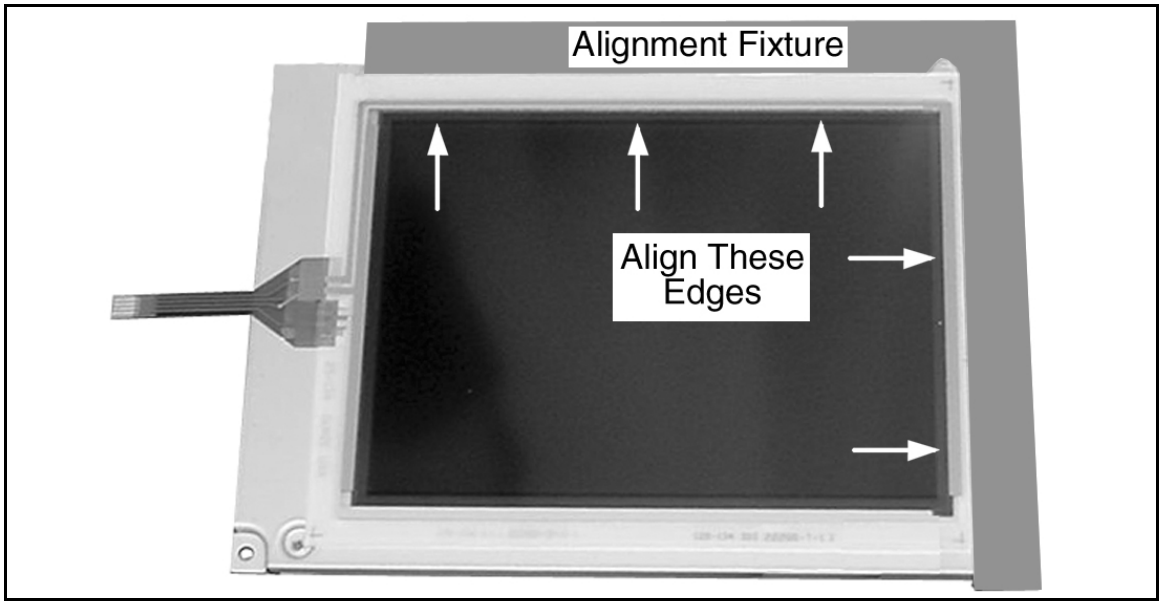


Figure 7-23. LCD/Touchscreen Alignment

Lithium Battery Replacement

A lithium battery (type - CR1632) is located on the global brain board. Its sole purpose is to maintain voltage to the real time clock circuit when the pump is OFF. This battery has a life of several years and should only require replacement if the pump fails to keep proper time while the pump is OFF. To replace this battery, the circuit board stack must be removed from the pump and disassembled. Perform the Board Stack Assembly Replacement procedure and the Board Stack Disassembly procedure, then follow the steps below.

1. Refer to Figure 7-24. Carefully lift the lithium battery out of its holder.
2. Place the new battery into the holder with the negative (-) terminal down.
3. Press the battery down into the holder. The battery should "click" into place under the small holding clips located around the inner edge of the battery holder.
4. Complete this procedure by following all local disposal requirements for the used Lithium battery.

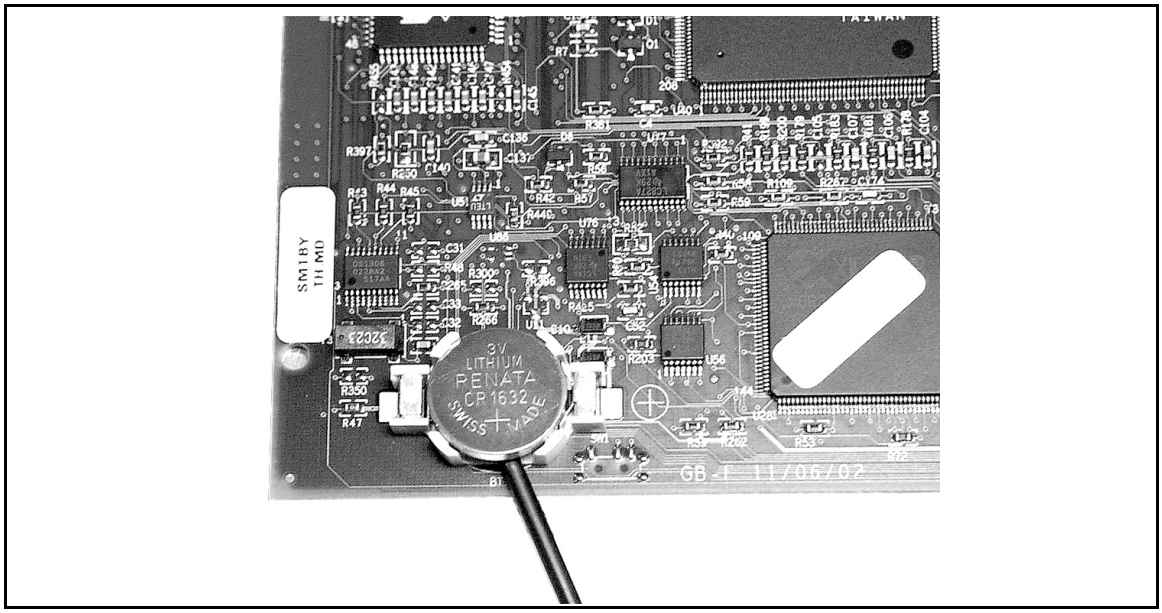


Figure 7-24. Lithium Battery Replacement

Buzzer Replacement

1. Refer to Figure 7-25. Use a T6 Torx driver to remove the two screws holding the buzzer in place.
2. An adhesive gasket also holds the buzzer into the housing. Pull straight up on the connecting wires with increasing pressure until the buzzer comes out of the housing.
3. If the adhesive gasket does not come out with the buzzer, remove it from the housing.
4. Remove the adhesive backing from the new buzzer.
5. Refer to Figure 7-25. Install the buzzer with the cutouts in line with the mounting holes and the wires oriented as shown.
6. To complete this procedure, replace and tighten the mounting screws to a torque of 3.0 ± 0.3 in-lb.

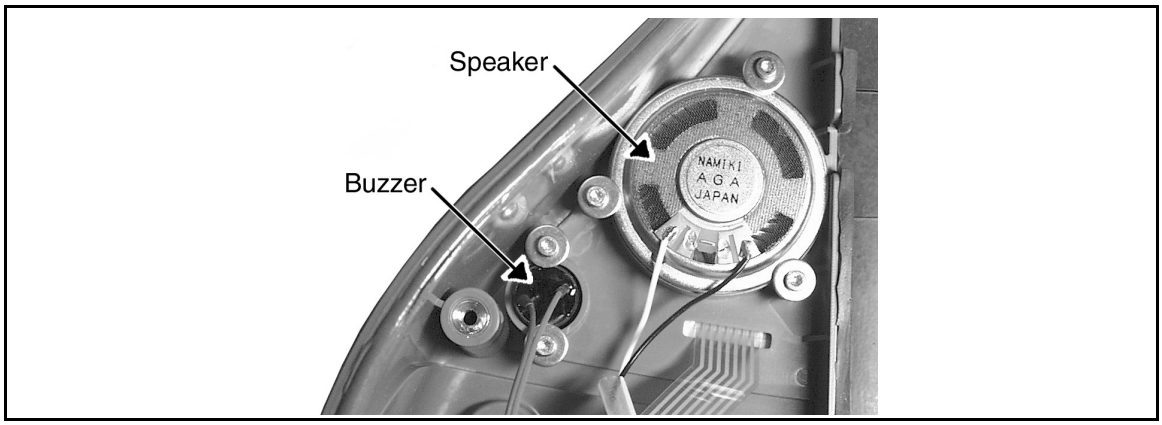


Figure 7-25. Buzzer and Speaker Mounting Locations

Speaker Replacement

1. Refer to Figure 7-25. Use a T6 Torx driver to remove the three screws holding the speaker in place.
2. The speaker is held in place by an adhesive gasket. To remove the speaker, pull straight up on the connecting wires with more and more pressure until the speaker comes out of the mounting hole.
3. If the adhesive gasket does not come out with the speaker, remove it from the housing.
4. Remove the new speaker adhesive backing and install the speaker with the wires oriented as shown.
5. To complete this procedure, replace and tighten the mounting screws to a torque of 3.0 ± 0.3 in-lb.

Backlight Inverter Board Replacement

1. Refer to Figure 7-26. Carefully disconnect the wire harnesses from connectors J1 and J2.
2. If not already done, disconnect the Power ON/OFF Switch flex circuit from J39 on the interface board.
3. Complete this procedure by lifting the backlight inverter board from its mountings.

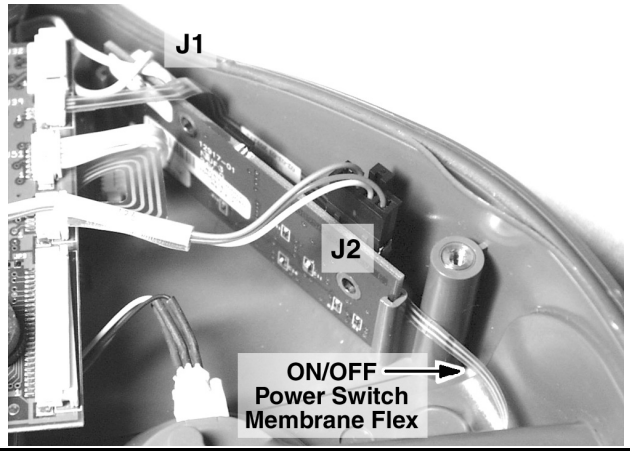


Figure 7-26. Backlight Inverter Board Location

Infrared (IrDA) Board Replacement

1. Refer to Figure 7-27. Disconnect the IrDA harness from J51 on the interface board.
2. Use a 2.0 mm hex driver to remove the 2 screws holding the IrDA board in place.
3. Remove the IrDA board and disconnect the wire harness from J1.
4. Connect the wire harness to J1 on the new IrDA board.
5. Use the mounting screws to install the new IrDA board.
6. Complete this procedure by tightening the screws to a torque of 8.0 ± 1.0 in-lb.

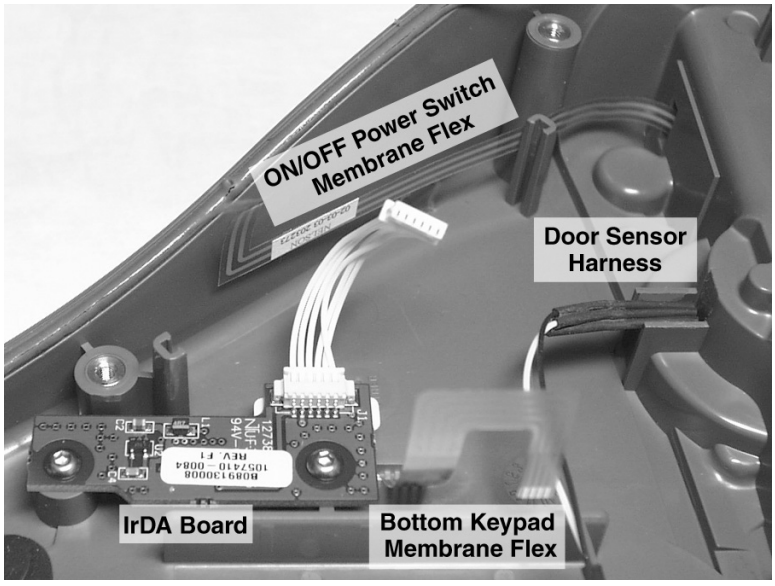


Figure 7-27. IrDA Board & Flex/Harness Locations

Door Sensor Replacement

Refer to Figure 7-27. The door sensor is held in place by a small amount of Loctite adhesive placed in the mounting hole.

1. Disconnect the door sensor harness from J28 on the interface board.
2. To remove the sensor, pull straight up on the connecting wires with increasing pressure until the sensor comes out of the mounting hole.Prior to installing the new sensor, ensure that it will fit properly by inserting it in the mounting hole. If the sensor does not reach the bottom of the hole, remove any residual Loctite material.
3. To install the new sensor, first bend the heat-shrink encased wires at a 90º angle at a point approximately 1/8" from the sensor body.
4. Place a drop of Loctite 425 into the mounting hole.
5. Brush a small amount of Loctite 712 accelerant onto the end of the sensor and slide it into the mounting hole. Push the sensor completely to the bottom of the hole.
6. Complete this procedure, after a few seconds delay, by checking that the sensor is held in place by the Loctite.

Syringe Diameter Sensor Replacement

CAUTION If the syringe diameter sensor is removed or replaced, the syringe diameter sensor calibration and verification procedure provided in Section 6 must be performed.

1. Refer to Figure 7-28. Use a 2.0 mm Hex driver and a 5.5 mm nut driver to remove the mounting hardware holding the diameter sensor flex circuit to the sensor bracket, and remove the syringe diameter sensor.
2. Refer to Figure 7-28. Attach the syringe diameter sensor flex circuit to the sensor bracket using the two screws and locknuts previously removed. (Correct orientation of the screws and locknuts is important.)
3. Complete this procedure by tightening the locknuts to a torque of 4.0 ± 0.5 in-lb.

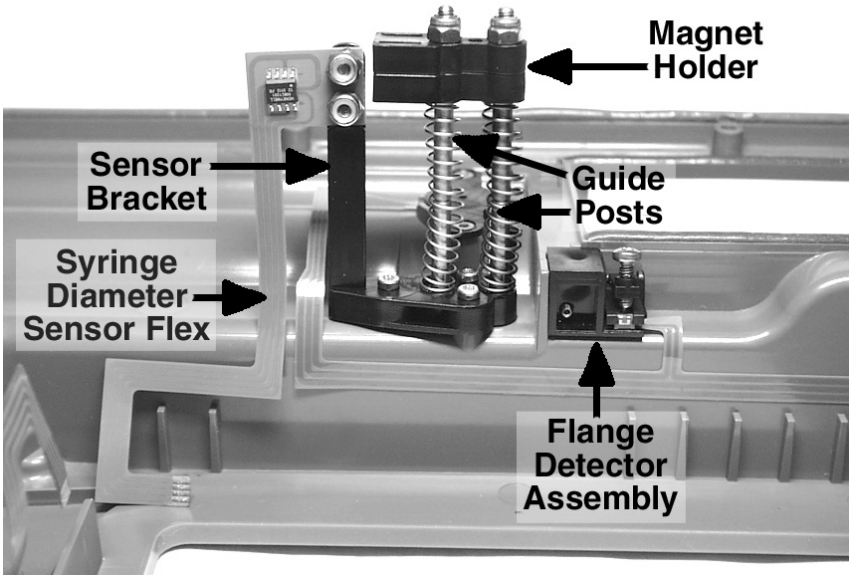


Figure 7-28. Syringe Diameter Sensor Assembly

Barrel Clamp Assembly Replacement

CAUTION If the barrel clamp assembly is replaced, the syringe diameter sensor calibration and verification procedure provided in Section 6 must be performed.

1. Refer to Figure 7-28. Hold each spring guide post with needle-nose pliers and use a 5.5 mm nut driver to remove the two locknuts on top of the posts.
2. Lift off the barrel clamp magnet holder and magnet.
3. While holding each spring, carefully remove the associated E-ring, then remove the two springs.
4. Slide the barrel clamp assembly out from the front of the housing.

5. Use a T6 Torx driver to remove three mounting screws and the barrel clamp sensor bracket from the housing.
6. Position the replacement sensor bracket on the housing and install the three mounting screws. (Do not over tighten; there is no torque requirement for these screws.)
7. Install the barrel clamp assembly through the mounting holes in the front of the housing.
8. Slide the two springs onto the guide posts and attach an E-ring in the slot on each post above the spring.
9. Position the magnet holder with magnet on top of the two posts and attach the two locknuts to the ends of the posts.
10. Hold each post secure and tighten the locknuts to a torque of 30.0 ± 3.0 in-oz.
11. Complete this procedure by raising each spring and applying a light coating of silicone grease to the lower 1/2" of each guide post.

Flange & Barrel Detector Assembly

Flange & Barrel Detector Removal

CAUTION

DO NOT remove this assembly unless it is absolutely necessary. If this assembly is replaced, precise and lengthy adjustment procedures must be performed.

These procedures require the use of a Baxter-created Flex Circuit Test Box Fixture (part # AS5YU4001), and four Baxter-created alignment gauges: part #'s 921-5001-869-1, 921-5001-869-2, 921-5001-869-3, and 921-5001-869-4

1. Refer to Figure 7-29. Use a T6 Torx driver to remove the two screws attaching the barrel detector position block to the housing.
2. Remove the barrel detector position block, and lift the barrel detector switch and switch holder out of the housing. (If needed, also remove the barrel detector boot.)

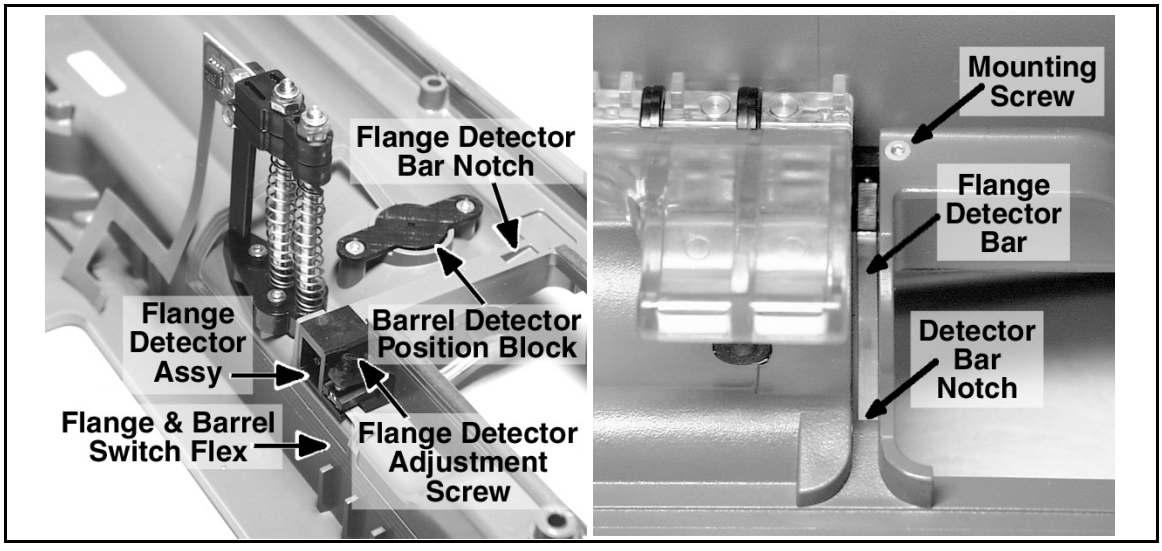
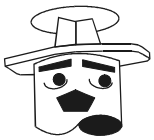


Figure 7-29. Flange & Barrel Detector Assemblies



HINT: In the following step, it is necessary to peel the flex circuit away from the housing. If both the flange detector switch and the barrel detector switch are working properly, careful removal will permit reuse of this assembly. During replacement, if the flex circuit will not adhere properly to the housing, use Kapton tape to hold it in place.

3. Carefully peel the flange and barrel switch flex circuit from the inside of the housing.
4. Refer to Figure 7-29. Remove the flange detector mounting screw.
5. Complete this procedure by carefully sliding the flange detector assembly out of the housing.

Flange & Barrel Detector Installation

1. Refer to Figure 7-29. Slide the flange detector bar through the housing and ensure the end of the bar extends into the detector bar notch.
2. Refer to Figure 7-29. From the outside of the housing, insert the flange detector mounting screw and tighten to a torque of 1.7 ± 0.17 in-lb.
3. Remove the backing from the flange and barrel switch flex circuit.
4. Position the flex circuit as shown and press down to adhere it to the housing.
5. If previously removed, install the barrel detector boot.
6. Install the barrel detector switch holder, switch, and position block.
7. Use two mounting screws to attach the barrel detector position block to the housing.
8. Complete this procedure by tightening the two mounting screws to a torque of 2.5 ± 0.25 in-lb.

Flange Detector Adjustment Procedure

The adjustment procedures which follow must be performed whenever the flange detector is removed and/or replaced in the front housing.

Flange Bar Height Adjustment

1. Position the front housing on top of two blocks or boxes (3" to 4" high), with the outside of the housing facing up and the handle pointing towards you.
2. Refer to Figure 7-30. Raise the barrel clamp arm and insert a 0.2" x 0.6" x 1.0" spacer such as a cut eraser or an extra motor back plate (Baxter part # B089622000) on its edge, under the clamp arm next to the two barrel clamp posts to hold the arm up.
3. Place the test box (P/N AS5YU4001) on a block or box (1.0" to 1.5" high) under the front housing. On the test box, raise the actuator on the small flex connector and insert the flange and barrel flex circuit, then press down on the actuator to clamp the flex circuit into the connector.
4. Press the flange detector shaft adjustment screw to manually activate the flange detector switch and ensure that LED1 (the flange detector switch LED) on the test box turns ON. If LED1 does not turn ON, reverse the orientation of the flex circuit connection, then press the adjustment screw again to light LED1. Once the flex circuit is properly connected so that LED1 turns ON, continue to the next step.

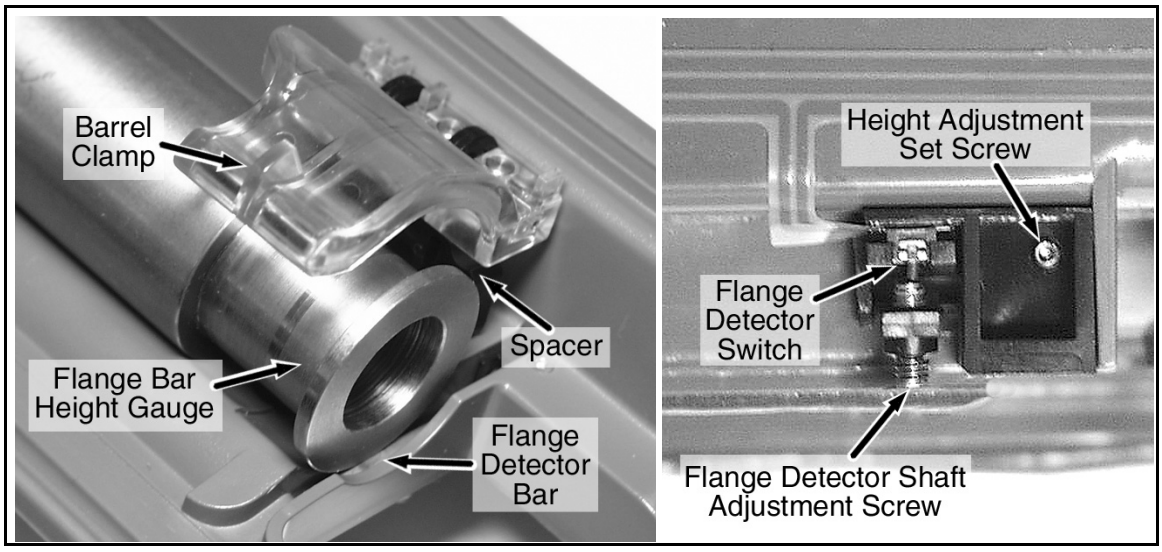
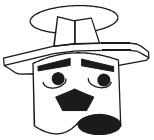


Figure 7-30. Flange & Barrel Detector Assemblies

5. Do not disconnect the flex circuit from the test box until told to do so in the adjustment procedure.
6. Refer to Figure 7-30. Use a small flatblade screwdriver to turn the flange detector shaft adjustment screw clockwise so it presses against the switch post until LED1 turns ON and remains ON when the screwdriver is removed.
7. Position the flange bar height gauge (921-5001-869-4) under the syringe barrel clamp with the flange of the gauge over or next to the pump's flange detector bar.



HINT: In the next step, the height adjustment set screw is typically hard to turn. The tapped hole is undersized so that Loctite is not necessary on this screw.

8. Refer to Figure 7-30. Use a 0.9 mm hex driver to turn the height adjustment set screw clockwise until the flange detector bar just touches the flange bar height gauge. (Press down on the flange detector bar a few times while adjusting to ensure that when the flange detector bar is in its normal resting position, it just touches the flange height gauge.)
9. Check that the flange detector shaft adjustment screw is still compressing the switch post (the LED is still lit) so that the switch post is applying spring force to the flange bar. If it is not applying spring force to the flange bar, start over at step 6.
10. Complete this procedure by removing the flange bar height gauge from under the syringe barrel clamp.

Flange Bar Height Check & Readjustment

1. Position the flange bar gap check gauge (921-5001-869-2) under the syringe barrel clamp with the gauge's flange positioned slightly away from the pump's flange detector bar.
2. Gently slide the gauge toward the flange detector bar. Check that the edge of the gauge will slide over the top of the flange detector bar without touching the bar.

3. If the gauge does not slide over the top of the flange detector bar, turn the height adjustment set screw counterclockwise slightly until the flange bar gap check gauge just clears the flange detector bar.
4. Check that the flange detector shaft adjustment screw is still compressing the switch post so that the switch post is applying spring force to the flange bar. If it is not applying spring force to the flange bar, readjust the flange detector shaft adjustment screw towards the switch post so that the screw depresses the switch post and applies force to the flange bar and then start over at step 1 of this procedure.
5. Verify that the flange bar gap check gauge still clears the flange bar.
6. Position the flange bar touches check gauge (921-5001-869-1) under the syringe barrel clamp with the gauge's flange positioned slightly away from the pump's flange detector bar.
7. Gently slide the gauge toward the flange detector bar. Check that the edge of the gauge touches the flange detector bar.
8. If the gauge slides over the top of the flange detector bar without hitting it, turn the height adjustment set screw clockwise slightly until the gauge just touches the flange bar and repeat steps 5 through 8.
9. Carefully remove the flange bar touches check gauge from the pump.
10. Remove the spacer from under the barrel clamp arm.

Flange Switch Adjustment

1. Using a small slotted screwdriver, turn the flange detector shaft adjustment screw counterclockwise until it is no longer touching the switch post and LED1 is OFF.

NOTE: The following step requires numerous small turns of the adjustment screw, where the screwdriver is removed and the flange detector bar is "tapped" or "bounced" to sneak up on the activation point.

2. With no gauge under the barrel clamp, turn the adjustment screw clockwise until LED1 just turns ON (switch closed).
3. Once the exact adjustment point is reached, back out the adjustment screw approximately ½ turn (+/- 1/8 turn).
4. Insert the flange present check gauge (921-5001-869-3) under the syringe barrel clamp with the flange in the flange slot.
5. If the LED1 does not light, slowly turn the adjustment screw clockwise until LED1 stays lit with the screwdriver removed.

Flange Switch Check & Readjustment

NOTE: In this procedure the flange present check gauge (921-5001-869-3) may be loaded and removed from the pump several times. It is recommended that the other three gauges be set out of reach to ensure only the correct gauge is used.

1. Remove and reload the flange present check gauge (921-5001-869-3).
2. If LED1 is off, adjust the flange detector shaft screw inwards towards the switch until the LED1 stays ON. Tap on the flange detector shaft screw while adjusting.

3. Remove the gauge. If LED1 stays ON, adjust the flange detector shaft screw away from the switch until LED1 turns OFF. Tap on the flange detector shaft screw while adjusting.
4. Reload the gauge. If LED1 does not stay ON with the gauge in place, repeat step 2. If LED1 stays ON without the gauge, repeat step 3.
5. Verify that LED1 turns ON and OFF consistently while loading and unloading the gauge. If the Flange Sensor can not be properly adjusted within eight attempts, the front housing with flange sensor should be returned to Baxter for service.
6. Remove the gauge and set it aside.
7. Insert the flange bar height gauge (921-5001-869-4) under the syringe barrel clamp with the flange in the flange slot.
8. If LED1 turns ON, repeat the complete Flange Detector Adjustment Procedure starting with the Flange Bar Height Adjustment.

Flange Bar Height Check After Flange Switch Adjustment

1. Remove the previous gauge and place the spacer back under the barrel clamp arm again.
2. Position the flange bar gap check gauge (921-5001-869-2) under the syringe barrel clamp with the gauge's flange positioned slightly away from the pump's flange detector bar.
3. Gently slide the gauge toward the flange detector bar. Check that the edge of the flange will slide over the top of the flange detector bar without hitting the side of the bar.

   If the gauge slides over the top of the flange detector bar, the height adjustment is correct (not too high).

   If the gauge hits the flange detector bar, the bar height is not adjusted correctly. The flange detector shaft screw may not have correctly pressed on the switch post during the procedure. Readjust from the beginning of the adjustment procedure or replace the flange detector assembly.
4. If the gauge hits the flange detector bar, (the flange detector shaft screw may not have correctly pressed on the switch post during the procedure) restart the procedure from step 3.
5. Position the flange bar touches check gauge (921-5001-869-1) under the syringe barrel clamp with the gauge's flange positioned slightly away from the pump's flange detector bar.
6. Gently slide the gauge toward the flange detector bar. Check that the edge of the flange hits the side of the flange detector bar and does not slide over it.

   If the edge of the flange hits the side of the flange detector bar and does not slide over it, the height adjustment is correct (not too low).

   If the gauge does not hit the flange detector bar, the bar height is not adjusted correctly. The flange detector shaft screw may not have correctly pressed on the switch post during the procedure. Readjust from the beginning of the adjustment procedure or replace the flange detector assembly.
7. Remove the gauge and the spacer.

Flange Switch Threshold Verification

1. Position the flange present check gauge (921-5001-869-3) under the syringe barrel clamp with the flange in the flange slot.
2. If LED1 is ON, the threshold is correct (not too sensitive). If LED1 is off, the assembly is not adjusted correctly. Readjust the sensor or replace the flange detector assembly.
3. Remove the gauge.
4. Position the flange bar height gauge (921-5001-869-4) under the syringe barrel clamp with the flange in the flange slot.
5. If LED1 is off, the threshold is correct (not too sensitive). If LED1 is ON, the assembly is not adjusted correctly; readjust the sensor or replace the flange detector assembly.

Flange & Barrel Detector Verification

1. With the test box still connected, load an empty 60 cc B-D or MONOjECT syringe under the barrel clamp arm with the syringe's flange in the flange slot on the front housing.
2. Verify that both LED1 (flange detector) and LED2 (barrel detector) are ON.
3. Remove the syringe.
4. Verify that both LED1 (flange detector) and LED2 (barrel detector) turn OFF when the syringe is removed.
5. On the test box, raise the actuator on the connector and remove the flex circuit.
6. Add Loctite 425 to the exposed threads of the flange detector shaft screw right next to the flange detector shaft.
7. Complete this procedure by verifying the adhesive backing on the flange & barrel switch flex is attached to the front housing.

Top Keypad Membrane Replacement

1. Lift a corner of the old keypad membrane and peel it away from the front housing.
2. Remove the old keypad membrane by pulling the flex circuit out through the slot in the front housing.
3. Being careful to not bend the new membrane keypad, peel off the backing material.
4. From the front of the housing, slide the new keypad membrane flex circuit through the slot.
5. Refer to Figure 7-32. Align the edge of the keypad membrane with the housing at the edge closest to the syringe compartment, then press the keypad in place.

NOTE: The keypad must fit into the recessed area when replaced.

6. Complete this procedure by pressing down the entire surface of the keypad.

Bottom Keypad Membrane Replacement

1. Lift a corner of the keypad membrane and peel it away from the front housing.
2. Remove the old keypad membrane by pulling the flex circuit out through the slot in the front housing.
3. Being careful to not bend the new membrane keypad, peel off the backing material.
4. From the front of the housing, slide the new keypad membrane flex circuit through the slot.
5. Refer to Figure 7-32. Align the keypad membrane with the housing at the edge closest to the syringe compartment, then press the keypad in place.

NOTE: The keypad must fit into the recessed area when replaced.

6. Complete this procedure by pressing down the entire surface of the keypad.

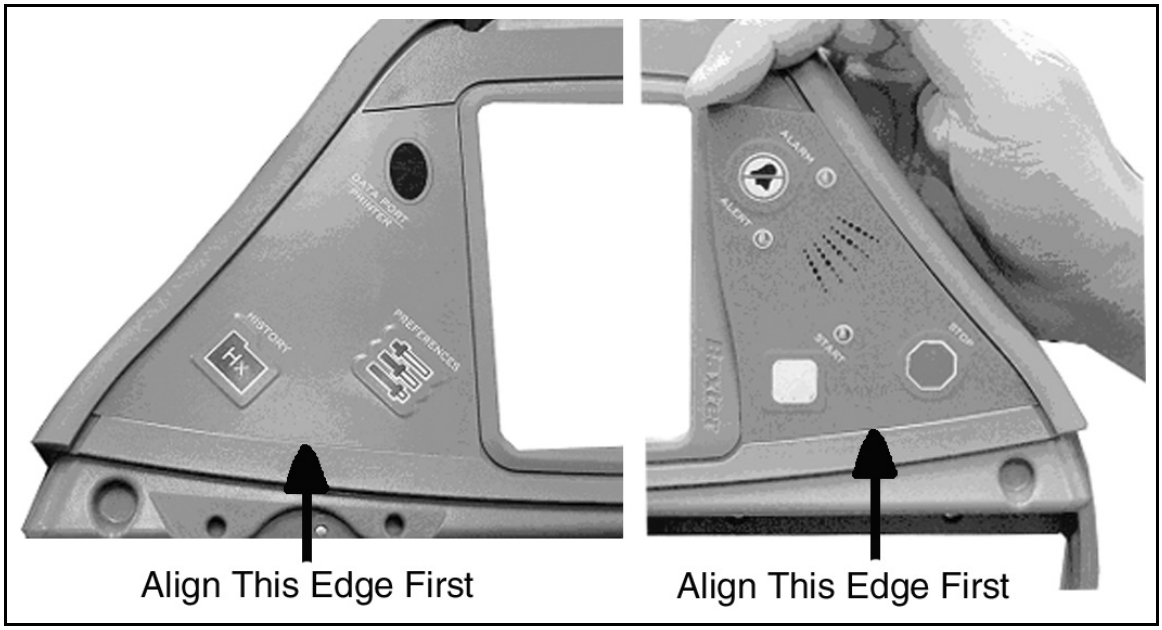


Figure 7-31. Flange Detector Mounting Screw Location

Power ON/OFF Switch Membrane Replacement

1. Lift a corner of the Power ON/OFF Switch membrane and peel it away from the front housing.
2. Remove the Power ON/OFF Switch membrane by pulling the flex circuit out through the slot in the front housing.
3. Being careful to not bend the new switch membrane, peel off the backing material.
4. From the front of the housing, slide the new switch membrane flex circuit through the slot.
5. Align the edge of the membrane closest to the flex circuit with the housing, and press the switch in place.

NOTE: The switch membrane must fit into the recessed area when replaced.

6. Complete this procedure by pressing down the entire surface of the membrane.

Rear Housing Internal Parts & Assemblies

Once the front and rear housings have been separated, the following procedures will assist in the replacement of parts and assemblies located inside the rear housing.

Drive Mech

Drive Mech Removal

1. Refer to Figure 7-32. Use a 2.0 mm hex driver to remove the two screws and washers holding the flex circuit, motor connector, and the PCA ferrite harness bracket to the housing.
2. Refer to Figure 7-33. Making sure not to damage any flex circuits or wire harnesses, carefully lift the drive mech and cabling out of the rear housing.

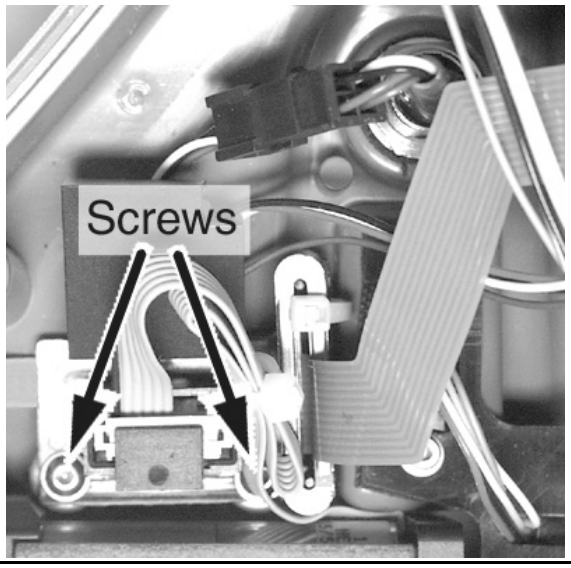


Figure 7-32. Drive Mech Electrical Connections

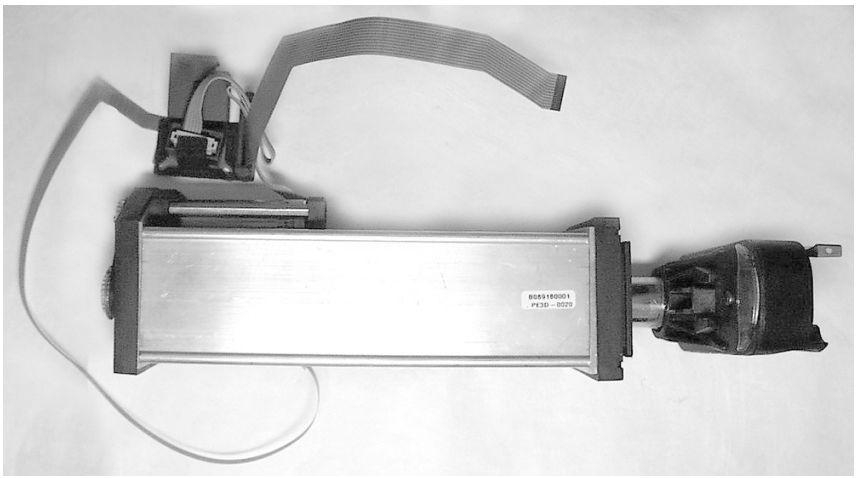
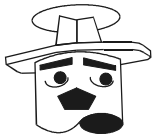


Figure 7-33. Drive Mech with Connectors Assembly

Drive Mech Installation

1. Refer to Figure 7-33. Position the drive mech and associated flex circuit and wire harness in position as shown.



HINT: In the following steps, make sure not to damage any flex circuits or wire harnesses during the drive mech installation.

2. Refer to Figure 7-33. Guide the rubber top and bottom drive mech block pads into position, as you carefully lower the drive mech with cabling into the rear housing.
3. Refer to Figures 7-32 and 7-53. Position the flex circuit, motor connector, and the PCA ferrite harness bracket in the housing as shown.
4. Make sure the PCA ferrite is positioned beneath the harness bracket, then use a 2.0 mm hex driver to install the two screws and washers to mount the PCA ferrite harness bracket and associated wiring. Tighten the two mounting screws to a torque of 5.0 ± 0.5 in-lb.

Motor Assembly Removal

1. Refer to Figure 7-34. Disconnect the motor harness connector and remove the PCA harness ferrite bracket as shown.

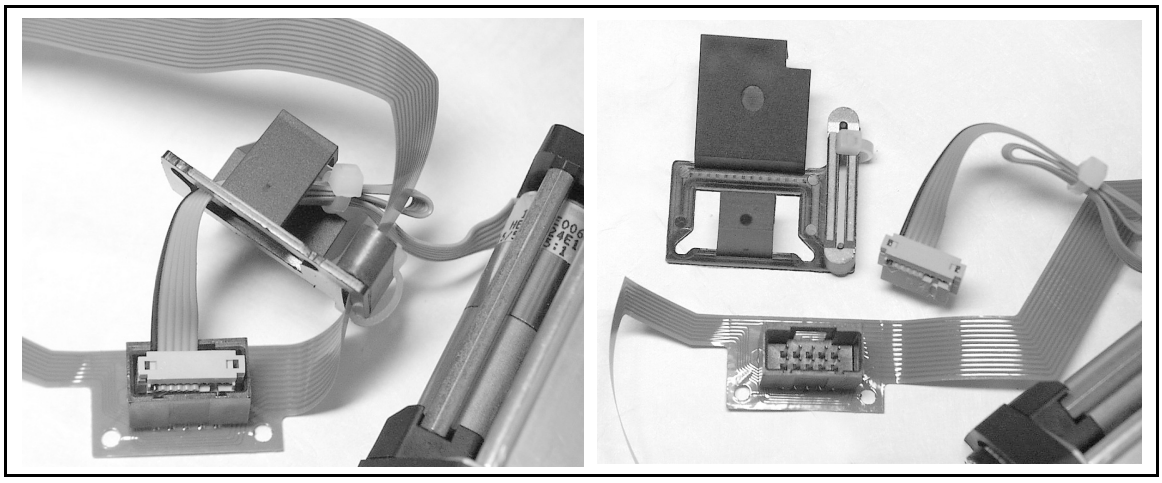


Figure 7-34. Drive Mech Wiring Disconnects

2. Refer to Figure 7-35. Remove the rubber bottom drive mech block pad.
3. Remove the retaining ring from the drive screw sprocket.
4. Carefully remove the motor drive belt by sliding it off of both sprockets at the same time.
5. Use a 1.5 mm hex driver to loosen the set screw in both the motor and drive screw sprockets and remove the sprockets. (Both sprockets are identical.)
6. Remove the four screws holding the motor mount assembly to the aluminum rail and remove the motor mount assembly from the rail.
7. Remove the preload washer and lower bearing from the end of the drive screw.

8. The weight of the slide assembly may cause the upper end of the drive screw to slide out of the upper bearing. To ensure the upper bearing does not get lost, remove it and place it with the other disassembled parts. The drive screw will be repositioned later in this procedure.
9. Refer to Figure 7-36. The parts shown on the left are those that were removed as part of this procedure.

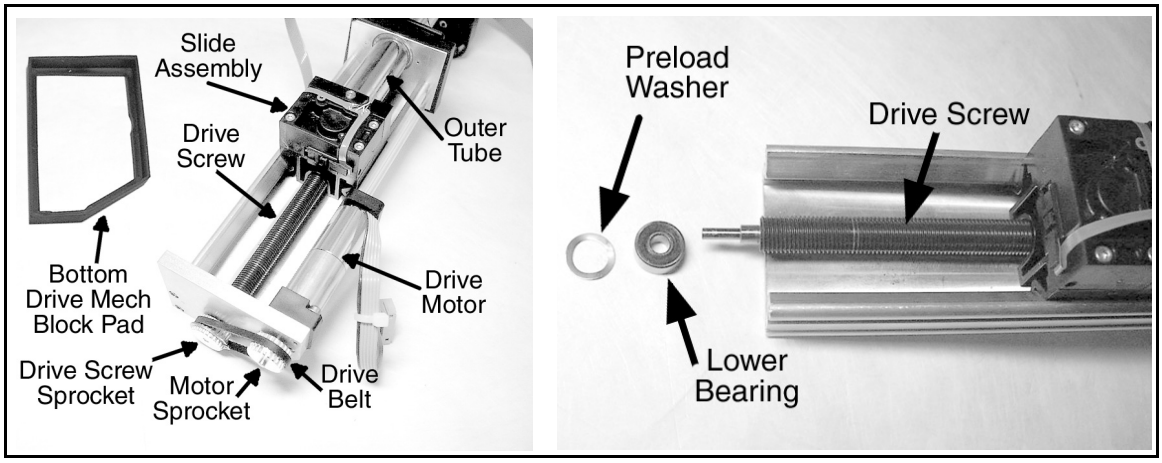
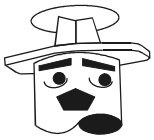


Figure 7-35. Drive Mech Assembly

Motor Assembly Installation

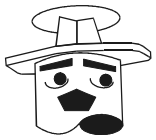
1. Hold the drive mech by the aluminum rail and in a position with the pusher block down and the opening for the motor assembly facing up. This provides easier access to parts for assembly.
2. With the drive mech in this position, it is easy to slide the upper bearing into its mounting location in the top drive mech block then position the drive screw into the upper bearing.
3. Place the lower bearing and then the preload washer on the end of the drive screw.



HINT: In the next step, as you move the motor assembly towards the aluminum rail, slide the drive screw with bearing and preload washer into position in the bottom drive mech block and then position the two alignment pins as you close the assembly together.

4. Align the motor assembly with the aluminum rail and position the drive screw, bearing, and preload washer in the mounting hole and the two alignment pins in the aluminum rail.
5. Use a 2.0 mm hex drive to install the four screws that hold the motor assembly to the aluminum rail and tighten them with a criss-cross pattern to a torque of 8.0 ± 1.0 in-lb.
6. Place one of the two sprockets onto the drive screw. (The notch in the toothed surface should be toward the outside of the assembly.)
7. Position the sprocket so that the set screw will tighten into the flat surface of the sprocket shaft.

8. To ensure the sprocket does not rub against the surface of the bottom drive mech block, place a 0.030" shim between the sprocket and the block, then use a 1.5 mm hex driver to tighten the set screw. Tighten the set screw to a torque of 20.0 ± 2.0 in-oz.
9. Place the second sprocket onto the motor shaft. (The notch in the toothed surface should be toward the outside of the assembly.)



HINT: In the next step it is very important to tighten the set screw into the flat surface on the motor shaft. However, once the sprocket is placed on the motor shaft, it will be very difficult to find the flat surface. To ensure proper positioning, use a marker to place a dot on the end of the motor shaft corresponding to the position of the flat surface.

10. Refer to Figure 7-37. Position the sprocket so that the set screw will tighten into the flat surface of the motor shaft.
11. To ensure the sprocket does not rub against the surface of the bottom drive mech block, place a 0.030" shim between the sprocket and the block, then use a 1.5 mm hex driver to tighten the set screw. Tighten the set screw to a torque of 20.0 ± 2.0 in-oz.
12. Carefully install the motor drive belt by sliding it onto both sprockets at the same time.
13. Install the retaining ring onto the drive screw sprocket.
14. Place the rubber bottom drive mech block pad in position on the end of the assembly.
15. Refer to Figures 7-32 and 7-34. Install the flex circuit through the ferrite on the PCA harness ferrite bracket, then insert the motor harness connector down through the bracket and connect it into the flex circuit connector.
16. Complete this procedure by ensuring that the flex circuit and motor harness are properly positioned for subsequent drive mech installation into the rear housing.

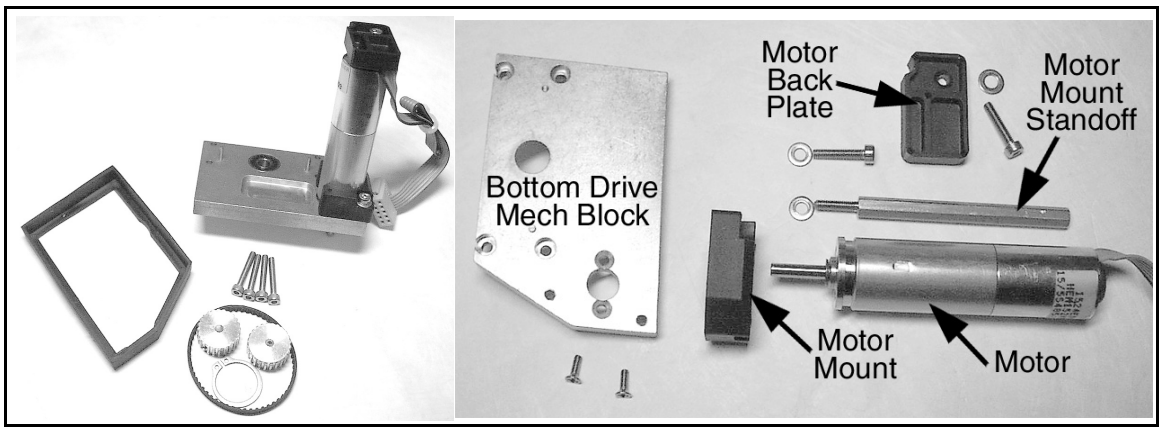


Figure 7-36. Motor Mount Assembly

Motor Removal

To replace the motor, the motor mount assembly must be further disassembled.

1. Use a 2.0 mm hex driver to remove the screw and washer holding the motor back plate to the motor mount standoff.
2. If the rubber pad is adhered to the back of the motor, remove it to use on the new motor.

3. Use a 4.5 mm nut driver to remove the motor mount standoff and washer.
4. Use a 2.0 mm hex driver to remove the screw and washer holding the motor mount to the bottom drive mech block.
5. Complete this procedure by using a Phillips screwdriver to remove the two small screws mounting the motor to the bottom drive mech block.
6. Refer to Figure 7-36. The parts shown on the right are those that were removed as part of this procedure.

Motor Installation

1. Refer to Figure 7-37. Slide the front of the motor into the motor mount.
2. Rotate the motor until the mounting holes with the additional circle stamped into the metal are positioned as shown with the motor harness extending to the right.
3. Insert the motor into the bottom drive mech block and line it up with the mounting holes in the bottom drive mech block.
4. Insert the two small Phillips screws through the bottom drive mech block and into the motor. Tighten the screws to a torque of 4.0 ± 0.5 in-lb.
5. Use a 2.0 mm hex driver to install the screw and washer that holds the motor mount to the bottom drive mech block. Tighten the screw to a torque of 7.0 ± 0.7 in-lb.
6. Use a 4.5 mm nut driver to install the motor mount standoff and washer. Tighten the standoff to a torque of 7.0 ± 0.7 in-lb.
7. Place the motor back plate in position against the back of the motor with the rubber pad positioned between the two parts.
8. Use a 2.0 mm hex driver to install the mounting screw and washer through the motor back plate into the motor mount standoff.
9. Complete this procedure by aligning the motor back plate at the rear of the motor with the motor mount at the front of the motor and tightening the mounting screw to a torque of 4.0 ± 0.5 in-lb.

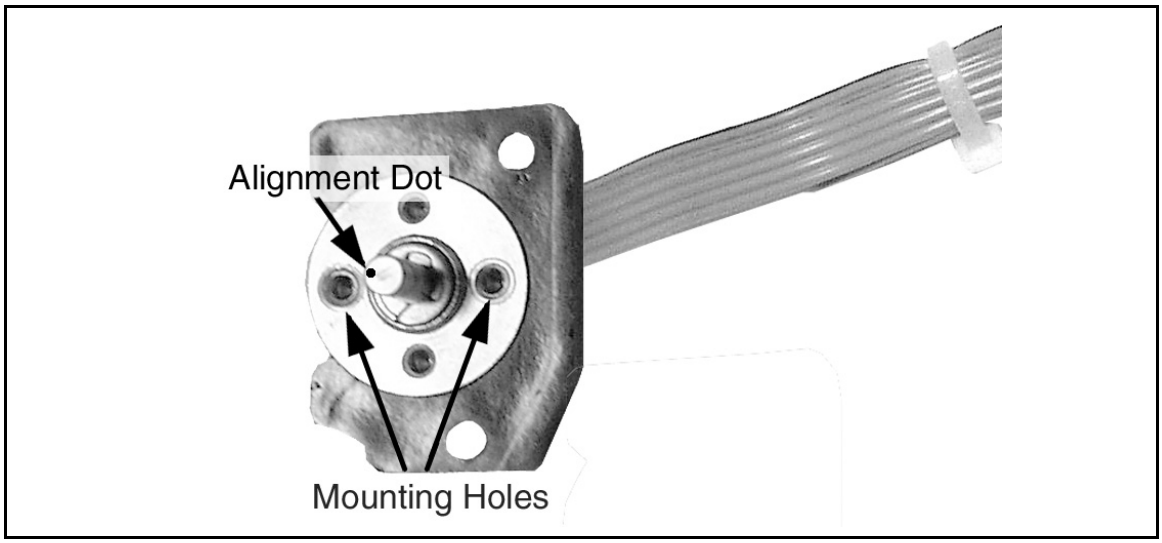


Figure 7-37. Motor Mounting

Drive Mech Disassembly

CAUTION

DO NOT disassemble the drive mech unless the Flex Circuit Test Box Fixture (Baxter part # 921-5001-852) is available. This fixture will be required in the rotary nut switch adjustment procedure which must be performed after the drive mech is reassembled.

1. Fully squeeze the pusher block release lever and slide the pusher block to its fully extended position.
2. Slide the rubber top drive mech block pad away from the drive mech.
3. Use a 2.0 mm hex driver to remove the four screws attaching the top drive mech block to the aluminum rail.
4. Hold the aluminum rail with one hand while fully squeezing the pusher block release lever to release the rotary nut from around the drive screw and pull the assembly away from the aluminum rail.
5. As you move the top drive mech block away from the slide assembly, take care to remove and set aside the top drive shaft bearing.
6. Use extreme care not to damage the flex circuit as you properly unsolder the six wires connected to it.

NOTE: In the next step, the spring loaded outer tube may pull away from the slide assembly. Do not lose the spring!

7. Refer to Figure 7-38. While holding the outer tube and slide assembly together, carefully push out the dowel pin (in either direction). The slide assembly may now be separated from the outer tube.
8. Remove the spring from the open end of the outer tube.
9. Refer to Figure 7-39. Pull the rotary nut actuator assembly out of the outer tube.
10. Extend the wires directly out from the outer tube, then slide the top drive mech block and its associated rubber pad off of the outer tube.

NOTE: Only remove the outer tube bushing from the top drive mech block if either of these parts needs to be replaced.

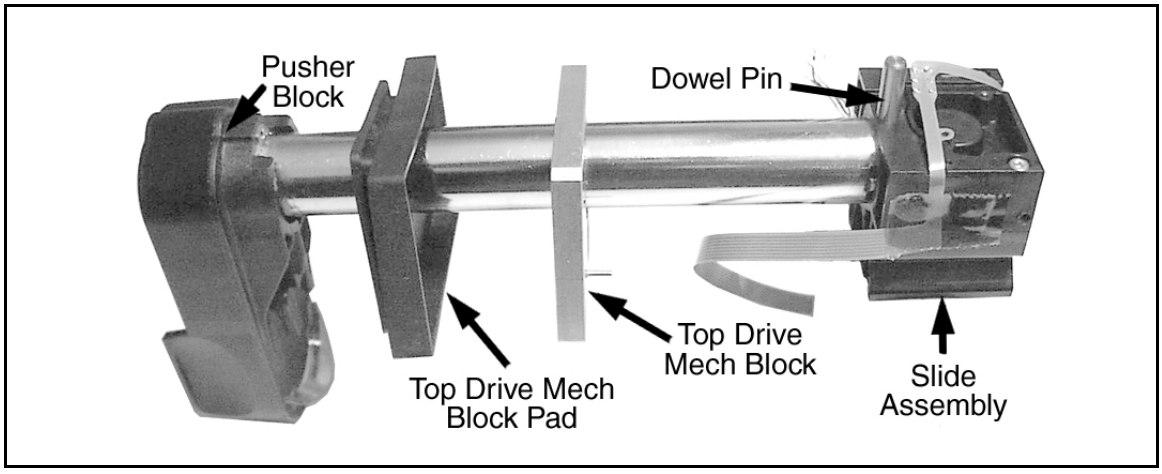


Figure 7-38. Pusher Block, Outer Tube & Slide Assembly

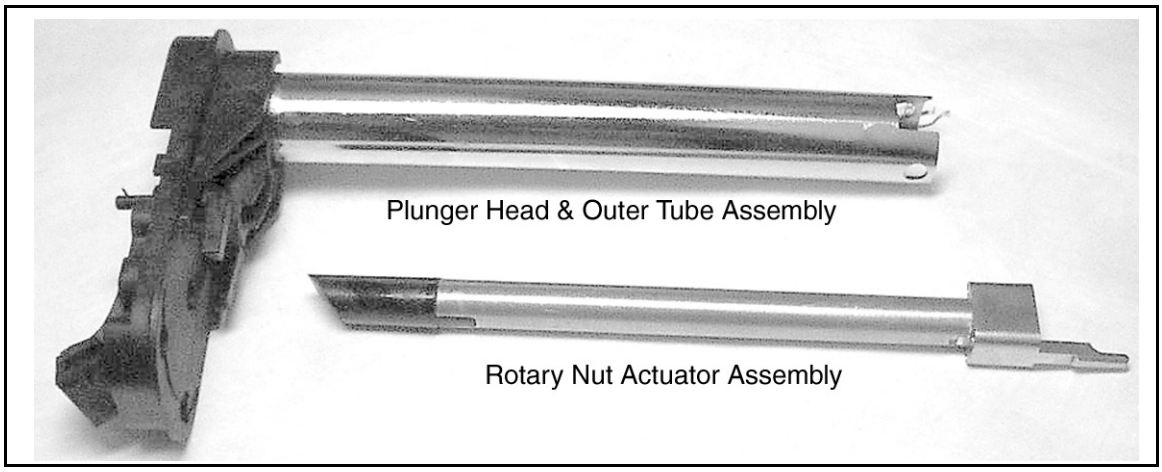


Figure 7-39. Plunger Head & Outer Tube & Rotary Nut Actuator Assembly

If further disassembly of the pusher block and outer tube assembly is needed, refer to the topic "Pusher Block & Outer Tube Disassembly" later in this section.

Drive Mech Reassembly

NOTE: If the outer tube bushing was previously disassembled from the top drive mech block, slide it onto the outer tube between the pad and the block. DO NOT attach.

1. Refer to Figure 7-38. Slide the top drive mech block pad and the top drive mech block onto the outer tube.
2. Refer to Figure 7-40. Apply a thin layer of silicone grease to all the indicated areas of the rotary nut actuator assembly, then slide it into the outer tube.

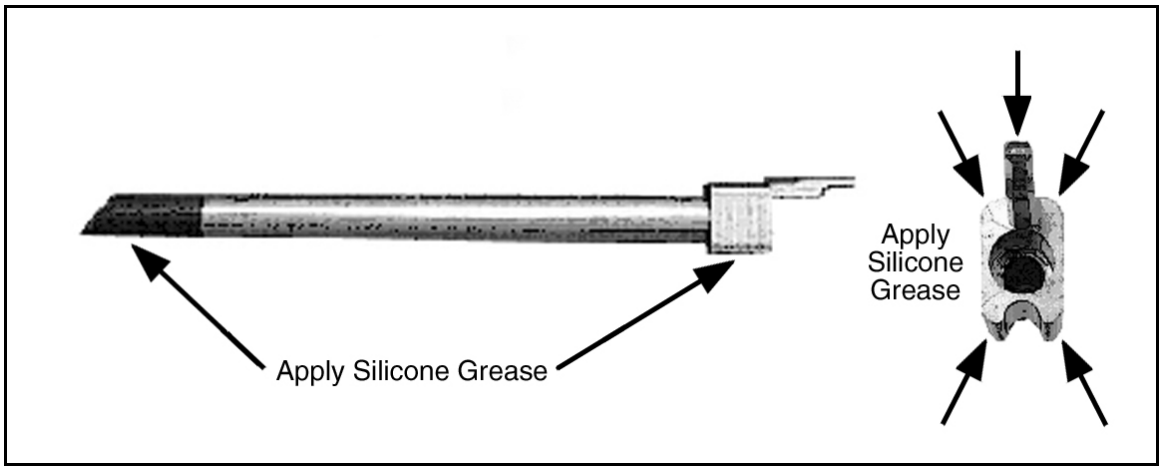


Figure 7-40. Outer Tube Mounting

3. Refer to Figure 7-41. Ensure the rotary nut actuator assembly fits as shown, then install the spring.

NOTE: Ensure the six wires are extending out of the narrower notch in the outer tube.

4. Refer to Figure 7-41. Being careful not to pinch the six wires, place the slide assembly onto the outer tube, then press and hold in position while installing the dowel pin through the slide assembly and capturing the outer tube.

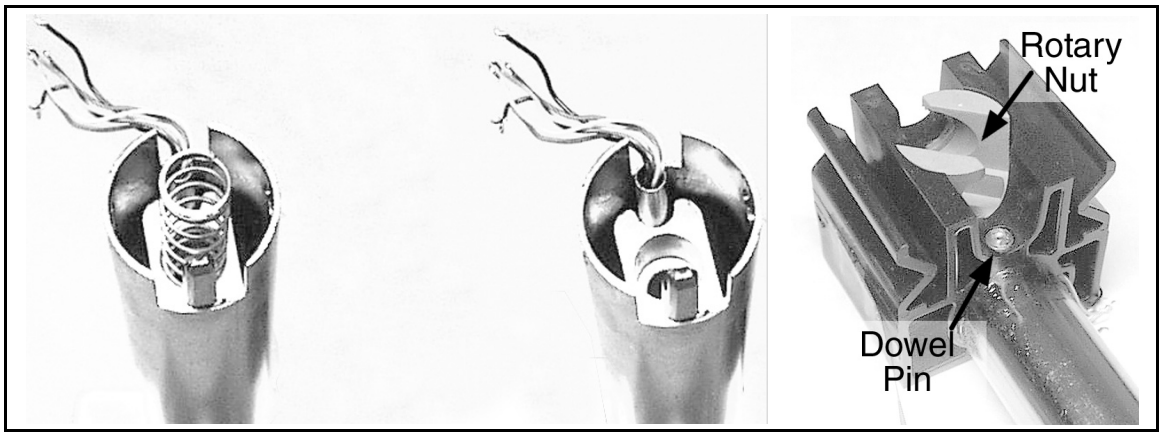


Figure 7-41. Outer Tube Mounting

5. Refer to Table 7-7 and Figure 7-42. Use the "Soldering Procedures" and wiring location illustration and carefully solder the six wires to the flex circuit.
6. Fully squeeze the pusher block release lever to open the rotary nut, slide the assembly onto the aluminum rail and the drive screw, then release the lever.
7. Place the top bearing onto the drive screw, then slide the top drive mech block against the aluminum rail.
8. Make sure the drive screw, top bearing, and the two alignment pins fit in position, then use a 2 mm hex driver to install the four mounting screws.
9. Tighten the screws in a crisscross pattern to a torque of 8.0 ± 1.0 in-lb.
10. If the outer tube bushing was previously removed from the top drive mech block, open the drive mech completely and install the bushing into the block using the two mounting screws. (Do not over tighten; there is no torque requirement for these screws.)
11. Slide the top drive mech pad into position.
12. Complete this procedure by extending the drive mech and applying a thin layer of silicone grease to the outer tube. Slide the outer tube back and forth to ensure ease of motion, then wipe off any excess grease.

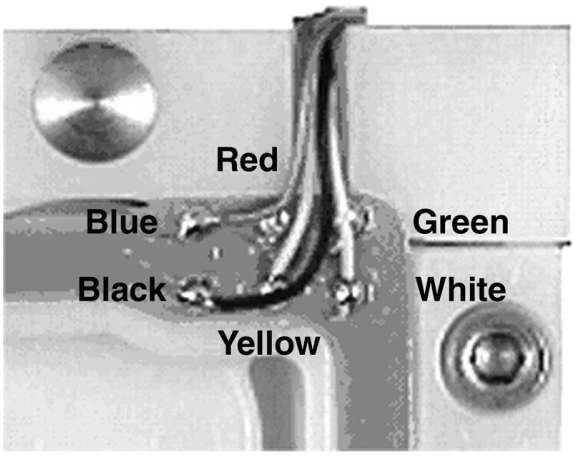


Figure 7-42. Wires Soldered To Motor & Rotary Switch Flex Circuit

Soldering Procedure

NOTE: If a new pusher block and outer tube assembly is being installed, the six wires extending from the outer tube will be longer than needed. Be careful not to trim the wires too short. Finish trimming each wire after it is soldered in place.

1. Refer to Figure 7-42. After attaching the outer tube to the drive mech slide assembly, carefully position the six colored wires in the holding slot and determine the length of each wire needed to reach the solder joints on the flex circuit.
2. If necessary, carefully strip off the insulation on each wire to the appropriate point determined in step 1.
3. Use a low wattage soldering pencil to pre-tin each lead. (DO NOT trim the wires at this time!)
4. If needed, use a low wattage soldering pencil to carefully pre-tin the six solder pads on the flex circuit attached to the slide assembly.
5. Use proper soldering techniques to attach each wire to the appropriate pad on the flex circuit, as close to the insulation as possible. (Use care not to overheat the flex circuit or to create cold solder joints.)
6. Once soldered in place, trim the remaining length of bare wire away from each solder joint.

Table 7-7. Soldering Procedure

Rotary Nut Switch Adjustment

This adjustment is required whenever a slide mechanism is replaced in the drive mech. It is used to set the trip point of the rotary nut switch and to test the operation of the thumb press switch located in the pusher block. The Flex Circuit Test Box Fixture (P/N AS5YU4001) is required for this adjustment.

1. With the pusher block lever released, hold onto the aluminum rail and apply several pounds of force in both directions to the slide assembly to fully seat the rotary nut threads into the drive screw threads.
2. On the test box, raise the actuator on the large flex connector, insert the motor & rotary switch flex circuit, then press down on the actuator to clamp the flex circuit in place.
3. Squeeze the pusher block lever to manually activate the rotary nut switch and ensure that LED3 (the rotary nut switch LED) on the test box turns ON. If LED3 does not turn ON, reverse the orientation of the flex circuit connection into the test box, and squeeze the pusher block lever again to light LED3. Once the flex circuit is properly connected so that LED3 turns ON, continue to the next step.
4. Refer to Figure 7-43. On the slide assembly, back out both the left side and right side set screws until 3/16" of the threads are exposed.
5. Apply Loctite 425 to the exposed threads of both set screws.
6. Move the rotary nut switch holder to the right, towards the motor and ensure that the test box LED3 is OFF (indicating the switch is open).

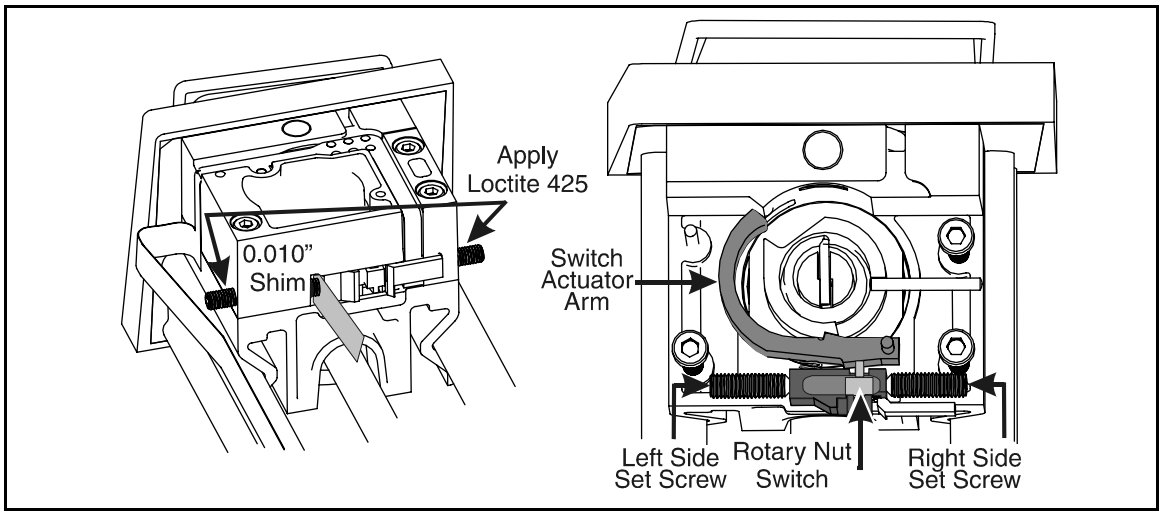


Figure 7-43. Rotary Nut Adjustment

NOTE: In the following steps, use caution not to over-tighten the set screws. Damage to the switch holder could occur.

7. Slowly screw in the right side (motor side) set screw until the test box LED3 turns ON (indicating the switch is closed), then back out the set screw ½ turn. (If the switch holder reaches the left side end of travel position and LED3 has not turned ON, back out the set screw ½ turn and continue to step 8.)
8. Refer to Figure 7-43. Insert a 0.010" shim between the switch holder and the left side set screw.
9. Screw in the left side set screw until it lightly captures the shim and pushes the switch holder up against the right side set screw. If LED3 turns OFF (indicating the switch is open), proceed to step 11 to complete this procedure.
10. If LED3 remains ON, turn the right side set screw ½ turn counterclockwise and then screw in the left side set screw again until it lightly captures the shim and pushes the switch holder up against the right side set screw. Continue this step until LED3 turns OFF (indicating the switch is open).
11. Remove the shim.
12. Watch LED3 while you once again apply a force of several pounds in both directions to the slide assembly. Ensure that LED3 remains OFF (indicating the switch is open).

    If LED3 should turn ON or flicker, move the switch holder a little more to the right by turning the set screw on the right side ½ turn counterclockwise and turning the set screw on the left side ½ turn clockwise). Retest by applying several pounds of force in both directions to the slide assembly.
13. On the test box, raise the actuator on the connector and remove the flex circuit.
14. Complete this procedure by using a paper towel to wipe off any excess Loctite on the sides of the slide assembly.

Rotary Nut Switch Adjustment Check

1. Slowly squeeze the pusher block lever until the test box LED3 turns ON (indicating a closed switch). At this lever position, the pusher block should not move.

2. Fully release the pusher block lever and press up and down on the pusher block so the rotary nut engages the threads on the drive screw. Verify that LED3 remains OFF (indicating an open circuit).
3. Fully squeeze the release lever and ensure LED3 turns ON (indicating a closed switch).
4. Release the lever and ensure LED3 turns OFF (indicating an open circuit).

Plunger Housing Cover Removal

1. Refer to Figure 7-44. To open the plunger assembly, first remove the two mounting screws and the plunger visor.
2. Remove the six screws that attach the plunger cover to the plunger housing.
3. Move the release lever to the left and raise the plunger cover off the housing.
4. Refer to Figure 7-45. The plunger housing assembly contains parts that should only be removed and replaced if they are the cause of the problem under investigation.

NOTE: If the load beam and pin assembly need to be replaced, it is not necessary to remove the plunger flex circuit. Refer to the Load Beam Replacement procedure provided later in this section.

Plunger Housing Cover Installation

1. Refer to Figures 7-44 and 7-45. Confirm that the load beam assembly is in the proper position. Then, while holding the release lever to the left, place the plunger cover assembly onto the housing.
2. Refer to Figure 7-44. While holding the housing cover in position, insert the plunger visor into the housing.
3. Insert two mounting screws through the housing cover and housing and into the plunger visor. Tighten these two screws to a torque of 4.0 ± 0.5 in-lb.
4. Complete this procedure by installing the additional six screws that hold the cover and housing together, then tighten them to a torque of 4.0 ± 0.5 in-lb.

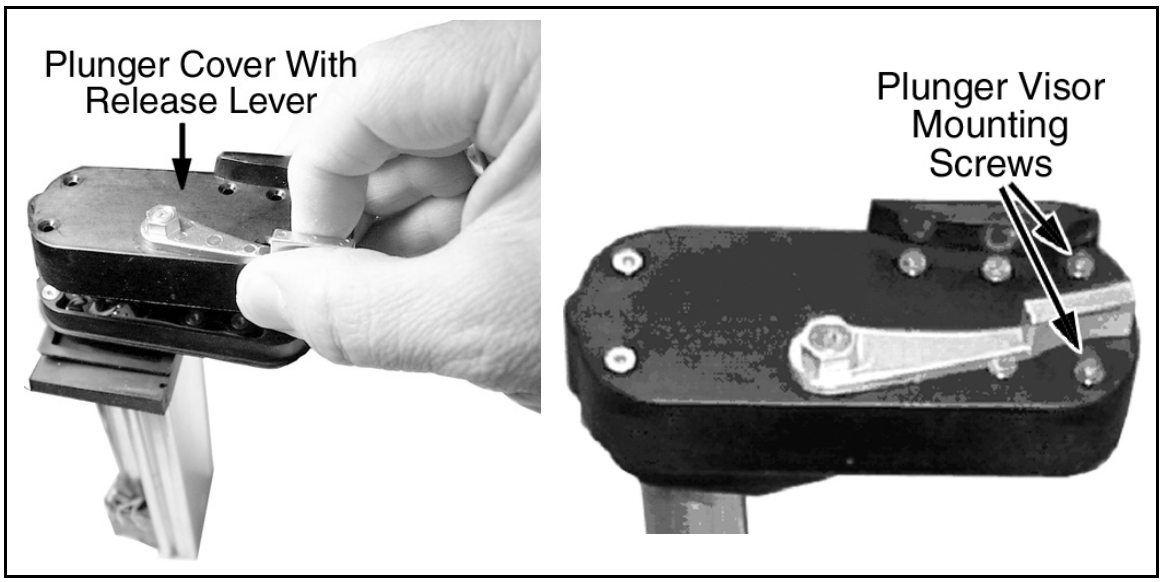


Figure 7-44. Plunger Housing & Cover Assembly

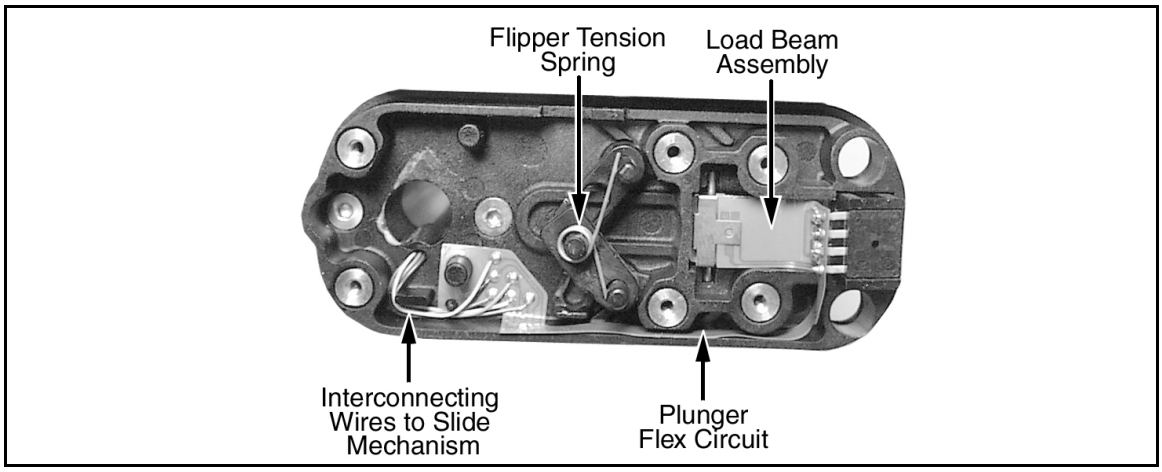


Figure 7-45. Plunger Housing Assembly

Pusher Block & Outer Tube Disassembly

CAUTION If the pusher block and outer tube assembly is removed or replaced, the linear position & occlusion sensor calibration and verification procedure provided in Section 6 must be performed.

Before performing this procedure, the pusher block and outer tube assembly must be removed from the drive mech and separated from the slide assembly. Refer to procedures provided earlier in this section.

1. Refer to Figure 7-46. To separate the outer tube from the housing, remove the two mounting screws and slide the outer tube off over the wire guide tube.
2. Refer to Figure 7-47. If replacing the plunger flex circuit, pull the wires through the wire guide tube and into the housing, then raise the load beam assembly from the housing and peel the flex circuit away from the housing.

NOTE: When the thumb press sensor switch or the pressure sensor are found to be faulty, replacement of the plunger flex circuit will be required. A new flex circuit includes the wires which are passed through the wire guide tube and connect to the drive mech slide assembly. The flex circuit does not include a load beam or the mounting clip or the dowel pin. Use the parts attached to the faulty flex circuit.

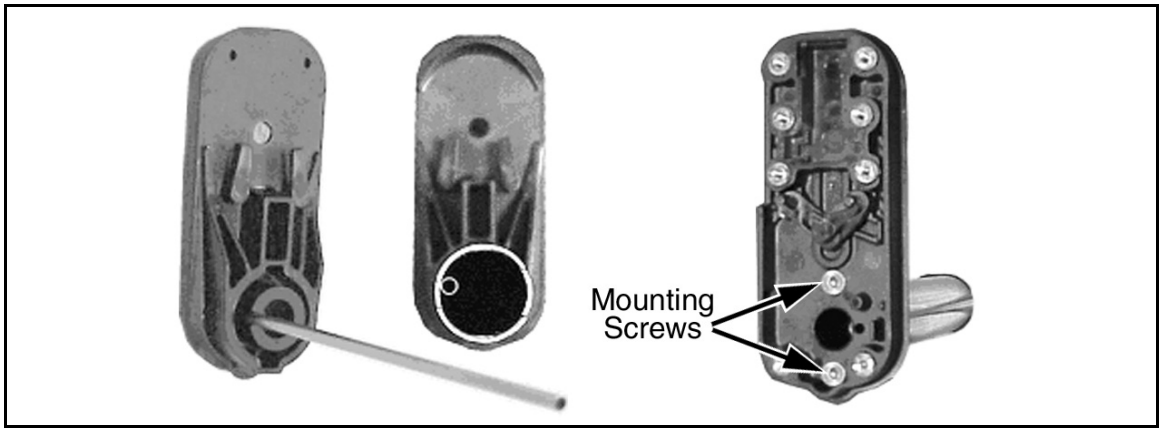


Figure 7-46. Outer Tube Mounting

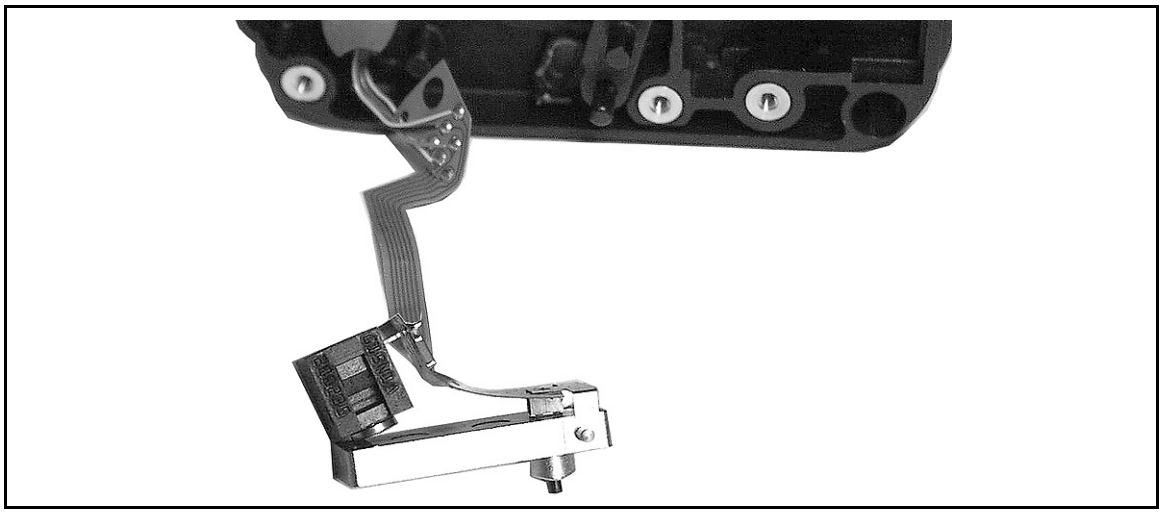


Figure 7-47. Plunger Flex Circuit & Load Beam Assembly

Pusher Block & Outer Tube Reassembly

Only those parts and assemblies previously disassembled should require reassembly. After this reassembly procedure is completed, refer to the procedures needed to attach this assembly to the drive mech and slide assembly.

1. Refer to Figure 7-46. From the outside of the plunger housing, insert the wire guide tube into its mounting hole.
2. Position the outer tube down over the wire guide tube. Align the wire guide tube with the smaller notch in the open end of the outer tube.
3. Add Loctite 425 to the threads of the two mounting screws and attach the outer tube to the plunger housing. Tighten the mounting screws to a torque of 10.0 ± 1.0 in-lb.
4. Refer to Figure 7-45. Put three twists in the wires extending from the plunger flex circuit and insert them through the plunger housing and wire guide tube.
5. Refer to Figures 7-45 and 7-47. Remove the adhesive backing from the plunger flex circuit and install the load beam assembly and flex circuit into the plunger housing as shown.
6. Once the flex circuit is properly positioned, place the wires around the boss and gently pull the wires out of the other end of the wire guide tube.

Load Beam Replacement

If the load beam assembly is found to be faulty, it can be carefully replaced without removing the flex circuit.

CAUTION If the load beam assembly is removed or replaced, the linear position & occlusion sensor calibration and verification procedure provided in Section 6 must be performed.

1. Refer to Figure 7-48. Disassemble and reassemble the load beam with the flex circuit mounted thumb press sensor switch and pressure sensor as shown.

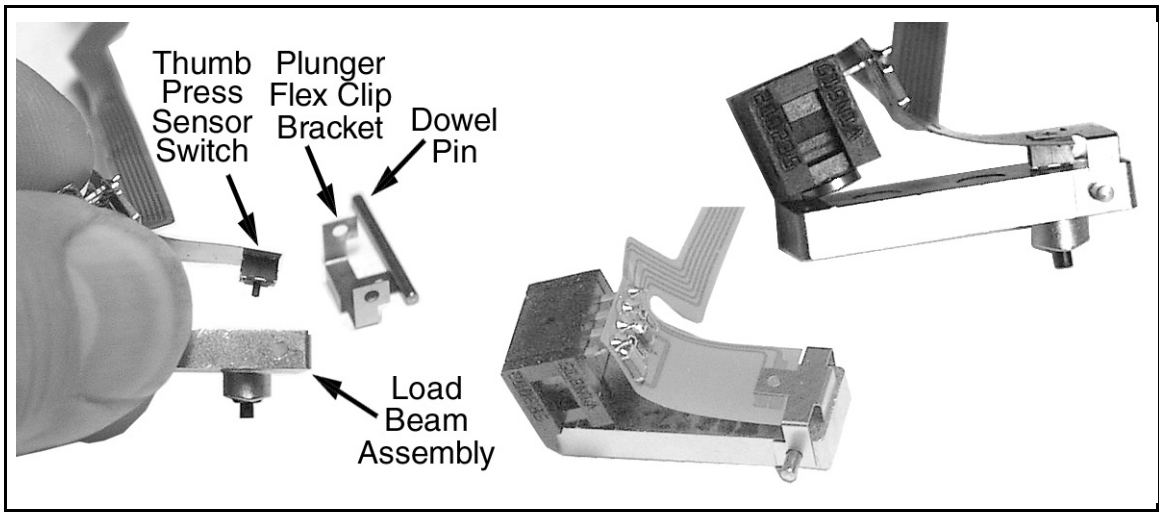


Figure 7-48. Load Beam & Plunger Flex Circuit Assembly

Flipper Assembly Replacement

CAUTION If the flipper assembly is removed or replaced, the linear position & occlusion sensor calibration and verification procedure provided in Section 6 must be performed.

1. Refer to Figure 7-45. Remove the flipper tension spring from its mounting post.
2. Use a 0.7 mm hex driver to remove the set screws holding the flippers to the flipper post and flipper loop.
3. Refer to Figure 7-49. Use a 0.7 mm hex driver to insert a 1.6 x 5 mm set screw into the flipper post link as shown.
4. From the outside of the plunger housing, insert flipper 1 through the mounting hole and place the flipper post mounting hole over the flipper 1 shaft as shown.
5. Use the 0.7 mm hex driver to insert the set screw through the flipper 1 shaft. Continue until the set screw is flush with the flipper post, then turn the set screw for two more full turns.
6. Refer to Figure 7-50. Use a 0.7 mm hex driver to insert a 1.6 x 5 mm set screw into the flipper loop link as shown.
7. Position the flipper loop onto the backside of the flipper post, then from the outside of the plunger housing, insert flipper 2 through the mounting hole and through the mounting hole for the flipper loop as shown.
8. Use the 0.7 mm hex driver to insert the set screw through the flipper 2 shaft and continue until the set screw is flush with the flipper loop, then turn the set screw for two more full turns.
9. Refer to Figure 7-45. Install the flipper tension spring as shown.

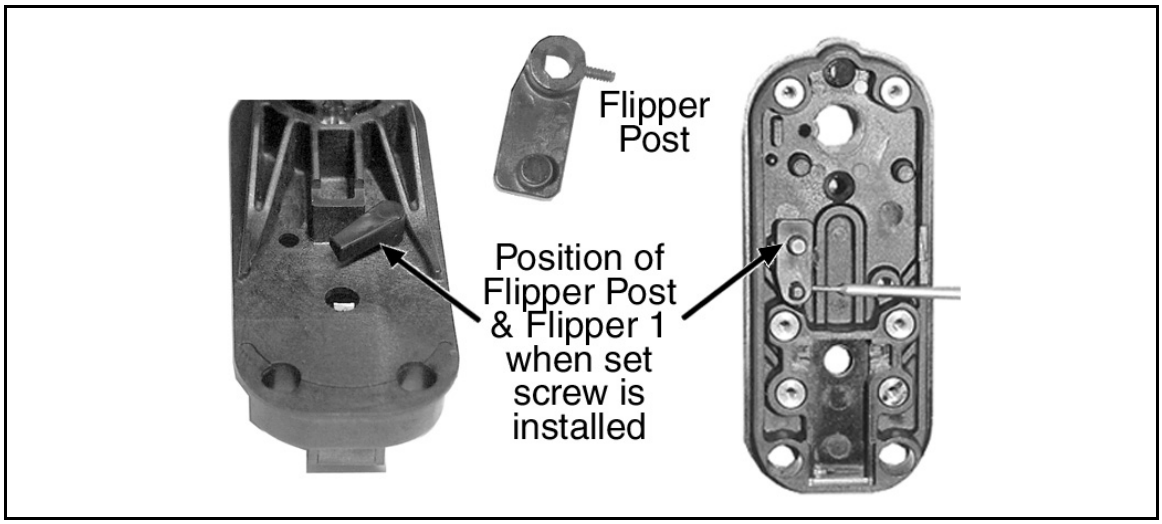


Figure 7-49. Flipper 1 Installation

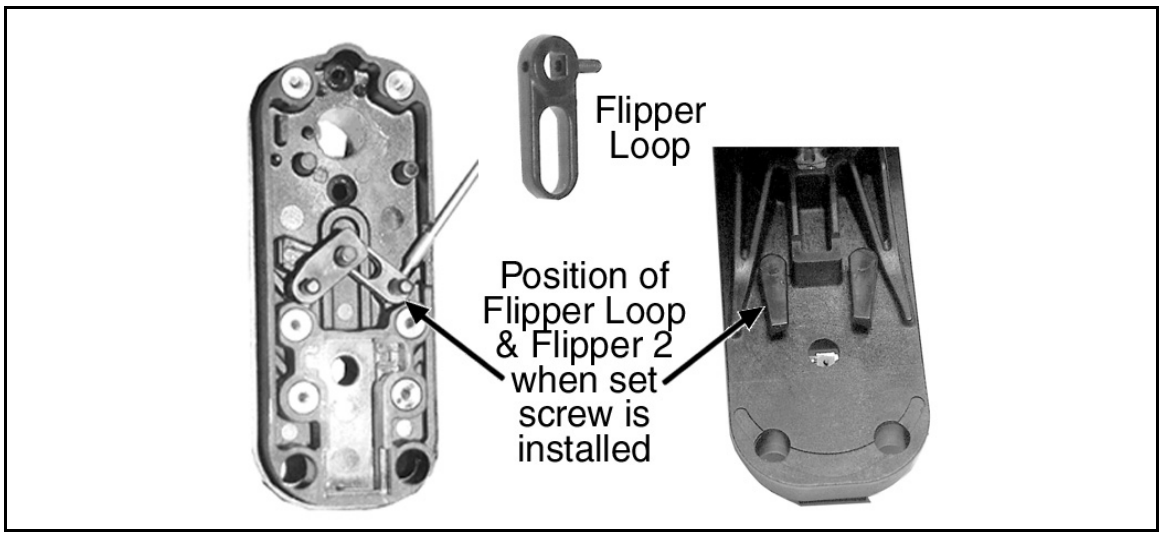


Figure 7-50. Flipper 2 Installation

Thumb Press Switch Test

After reassembly of the plunger and outer tube assembly and before continuing with further assembly procedures, it is good practice to test the thumb press switch for proper operation.

1. Connect an ohmmeter across the black and yellow wires extending from the wire guide tube.
2. Press the thumb press pin down and observe that the ohmmeter indicates a short (closed switch).
3. Continue to press the thumb press pin for at least 30 seconds. When releasing the thumb press pin, verify that the ohmmeter immediately changes from a short to an open reading.
4. To complete this procedure, press and release the thumb press pin several times and observe that the ohmmeter correctly indicates the switch open and closed conditions.

Plunger Hood Removal

CAUTION If the plunger hood is removed or replaced, the linear position & occlusion sensor calibration and verification procedure provided in Section 6 must be performed.

NOTE: The drive mech assembly must be removed prior to removing the plunger hood.

1. Refer to Figure 7-51. Use a 2.0 mm hex drive to remove the 5 screws that mount the plunger hood to the housing.

NOTE: Take care to not damage the linear position sensor flex circuit.

2. Carefully lift the plunger hood from the rear housing, turn it over, and remove the two screws holding the linear position sensor flex circuit in position.

Plunger Hood Installation

1. Replace the plunger hood by reversing the previous procedure. Tighten all 7 mounting screws to a torque of 8.0 ± 1.0 in-lb.

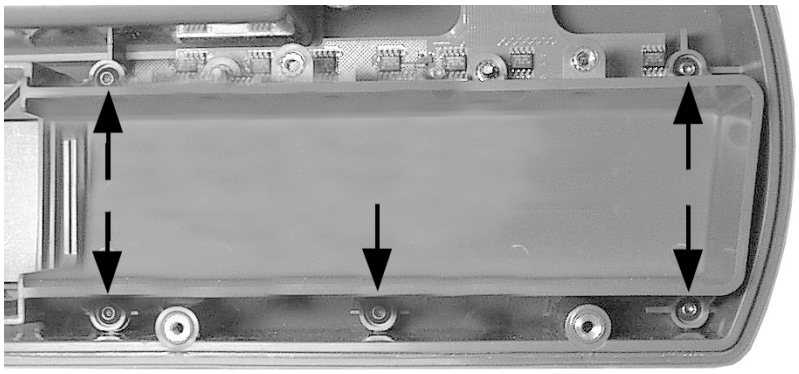


Figure 7-51. Plunger Hood and Linear Position Sensor Assembly

Linear Position Sensor Flex Circuit Replacement

CAUTION If the linear position sensor is removed or replaced, the linear position & occlusion sensor calibration and verification procedure provided in Section 6 must be performed.

1. Remove the plunger hood using the previous replacement procedure.
2. Peel the old position sensor flex circuit from the rear housing.
3. Refer to Figure 7-52. Use a permanent marker to draw a line across the flex circuit at a point 5 1/8" from the end, as shown.
4. Attach the new linear position sensor to the plunger hood and reinstall the plunger hood.
5. Remove the peel-off backing from the new linear position sensor flex circuit.
6. Refer to Figure 7-52. Align the flex circuit with the positioning mark in line with the left edge of the stack stand and between the 2 horizontal lines stamped on the housing.
7. Starting from the left, press down on the flex circuit to adhere it to the housing.

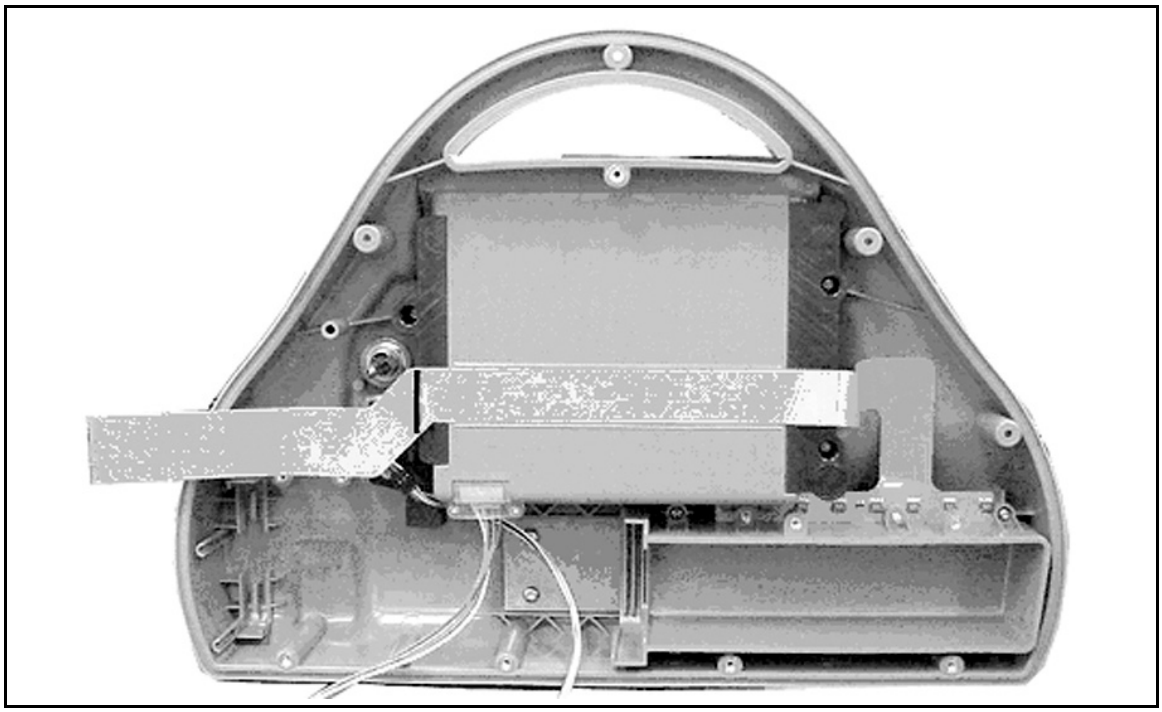


Figure 7-52. Linear Position Sensor Location

PCA Connector Harness Replacement

1. Refer to Figure 7-53. Remove the two screws and washers holding the flex circuit and motor connectors and the PCA ferrite harness bracket to the rear housing.
2. Remove the PCA ferrite ring from behind the bracket.
3. Open the connector between the PCA panel connector harness and the ferrite ring harness.
4. Use the PCA connector alignment tool to hold the connector while using a 9/16" open end wrench to remove the mounting nut and washer.
5. Push the PCA connector out from inside the housing.
6. Insert a new PCA panel connector harness from outside the rear housing.
7. Place the washer and nut onto the connector.
8. Use the PCA connector tool to hold the connector in position and the 9/16" open end wrench with torque driver to tighten the nut to a torque of 10.0 ± 1.0 in-lb.
9. Attach the connectors of the PCA panel connector harness and the ferrite ring harness.
10. Refer to Figure 7-53. Place the ferrite ring behind the PCA ferrite harness bracket and install the two screws and washers.
11. Tighten the screws to a torque of 5.0 ± 0.5 in-lb.

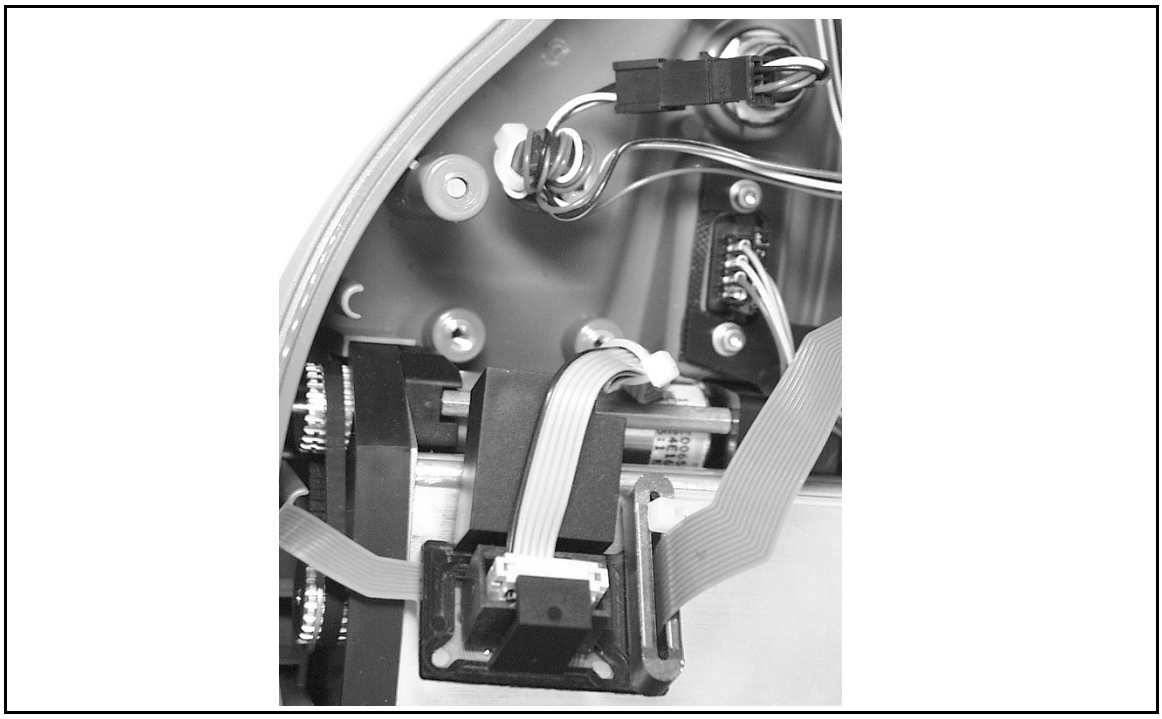


Figure 7-53. Motor Harness Connection and PCA Ferrite Positioning

RS-232 Connector Harness Replacement

NOTE: In step 1 that follows, the two D-sub mounting brackets on the outside of the rear housing will fall off.

1. Open the connector between the RS-232 panel connector harness and the ferrite ring harness.

1. Refer to Figure 7-54. Remove the 2 screws and washers holding the RS-232 ferrite harness bracket and the D-sub connector to the rear housing.
2. Slide the RS-232 ferrite harness bracket and ferrite ring harness off of the RS-232 panel connector harness.
3. Push the RS-232 panel connector harness out through the opening in the rear housing.
4. Place the RS-232 gasket over the new RS-232 connector harness and insert the new connector harness into the opening from outside the rear housing. Ensure the RS-232 connector aligns properly with the opening.
5. Place the RS-232 ferrite ring into the harness bracket and slide the bracket down over the RS-232 panel connector harness.
6. Use a 2.5 mm hex drive to attach the RS-232 ferrite harness bracket and the connector harness to the rear housing using the two screws and washers previously removed.
7. Refer to Figure 7-54. Thread each screw into a properly positioned D-sub mounting bracket on the outside of the pump and tighten to a torque of 5.0 ± 0.5 in-lb.

NOTE: The lipped edge of the mounting brackets rest against the bottom and top edges of the RS-232 connector.

Figure 7-54. RS-232 Harness Installation

Power Board Harness Replacement

1. Refer to Figure 7-55. Use a T-6 Torx driver to remove the two mounting screws and the connector clamp panel from the rear housing.
2. Slide the power board harness out of the rear housing.
3. Insert the new power board harness and use the two mounting screws to install the connector clamp panel.
4. Tighten the two mounting screws to a torque of 2.5 ± 0.2 in-oz.

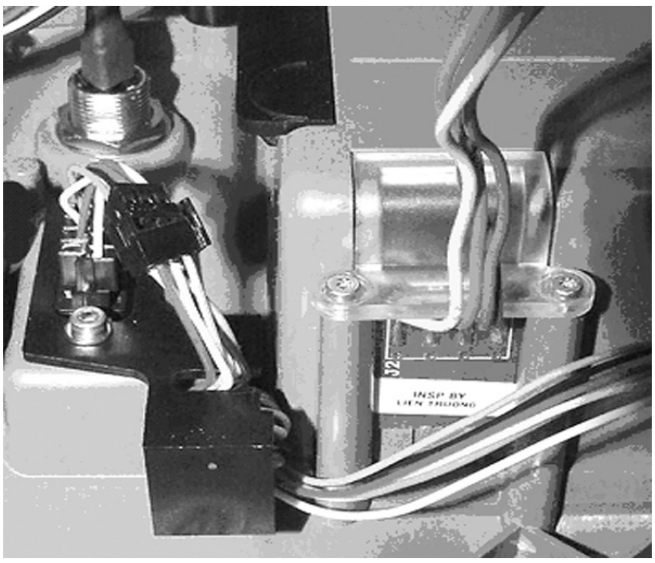


Figure 7-55. Power Board Harness Installation

Pole Clamp Replacement

NOTE: The drive mech assembly and the plunger hood housing must be removed prior to removing the pole clamp.

1. Rest the rear housing on the pole clamp.
2. Remove the 4 screws holding the pole clamp plate and the pole clamp against the rear housing.
3. Lift the rear housing away from the pole clamp assembly.
4. Place the rear housing on top of the new pole clamp assembly so that the handle of the pump points in the opposite direction to the knob on the pole clamp.
5. Position the internal pole clamp plate with the curved surface against the rear housing.
6. Add Loctite 222 to the threads of the four mounting screws.
7. Use a 2.5 mm hex driver to thread the four mounting screws through the pole clamp plate and rear housing into the pole clamp assembly.
8. When all four screws have been installed, tighten them to a torque of 10.0 ± 1.0 in-lb.

Pole Clamp Disassembly

1. Refer to Figure 7-59. Use 0.026" snap ring pliers to remove the 3/16" retaining ring holding the pole clamp tip pad onto the end of the shaft, then remove the pad. (If the shaft is the newer style, also remove the 5/16" retaining ring found behind the tip pad.)
2. Rotate the pole clamp knob counterclockwise and remove the knob assembly from the lock housing.
3. Use a # 4 spanner driver to carefully loosen and remove the four tamper-resistant screws which attach the lock housing to the bracket.
4. Watch for a loose gear as you carefully lift the lock housing away from the bracket.
5. Remove the drive gear with dowel pin from the housing. (This one may have fallen out as you took the housing and bracket apart.)
6. Use a 7/16" nut driver to remove the hex nut from the lock post, and lift off the drive gear and the cam stop.
7. Use a 7/8" nut driver to remove the large hex nut, then remove the lock washer and pull the lock out of the housing.
8. If necessary, use a 1/4" nut driver to remove the mounting screw and washer holding the spring clutch onto the bracket.

Pole Clamp Reassembly

1. Refer to Figure 7-56. Install the spring clutch onto the pole clamp bracket by placing the washer on the hex bolt and inserting it through the mounting hook and into the pole clamp bracket, but do not tighten.
2. Refer to Figure 7-56. Thread the shaft of the pole clamp knob through the spring clutch windings and into the bracket until the tip of the shaft protrudes at least 1/4” through the other side. Ensure the “tail” of the spring clutch is parallel to the side of

the bracket as shown and the spring windings are centered over the hole, then tighten the hex bolt to a torque of 30.0 ± 1.0 in-lb.

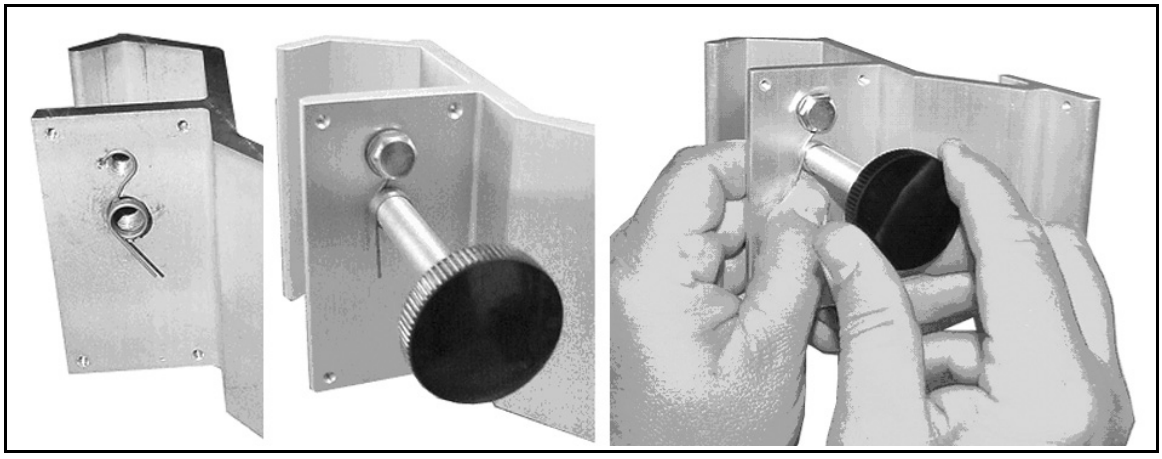


Figure 7-56. Pole Clamp Spring Clutch

3. Refer to Figure 7-56. Remove the pole clamp knob shaft from the spring by deflecting the spring's "tail" outwards and turning the knob counterclockwise.
4. Using the key, rotate the lock to ensure it functions properly, then place the lock into the locked position and remove the key.
5. Refer to Figure 7-57. Place the lock into the cover housing. (The lock's cam stop must be in the specific location shown.)

NOTE: The orientation of the lock cam is critical! Be sure it is positioned correctly before continuing with the procedure.

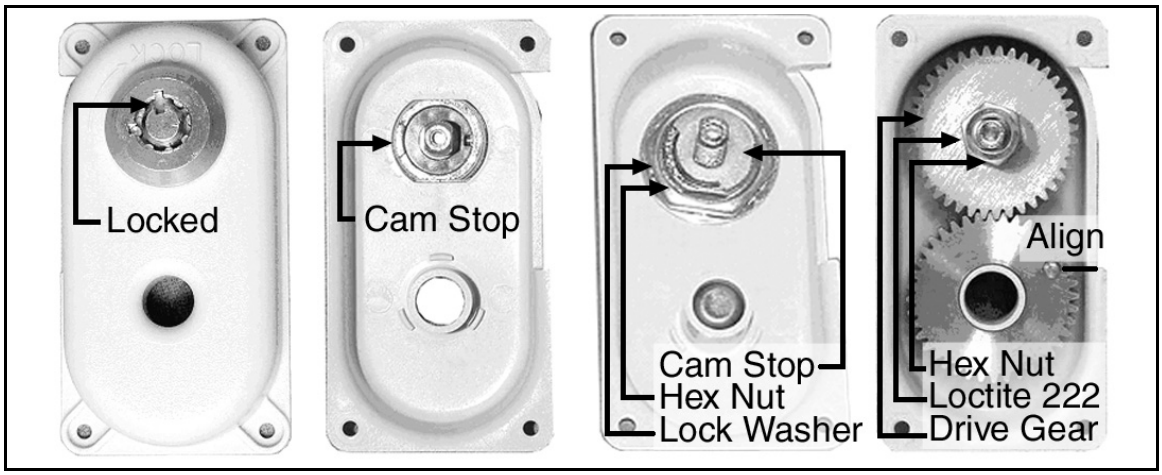


Figure 7-57. Pole Clamp Lock Assembly

6. Hold the lock into the lock cover housing, and install the lock washer and hex nut onto the threaded lock post.
7. While keeping the lock body centered within the double, flat-sided mounting hole (or biased counterclockwise), use a 7/8" nut driver to tighten the hex nut to a torque of 65.0 ± 6.0 in-lb.
8. Refer to Figure 7-57. Install the pole clamp cam stop onto the lock post as shown.

9. Refer to Figure 7-57. Install the drive gear onto the lock post, and apply Loctite 222 to the lock post threads.
10. Refer to Figure 7-57. Use a 7/16" nut driver to install the hex nut and tighten it to a torque of 30.0 ± 3.0 in-lb.
11. Refer to Figure 7-57. Install the drive gear with dowel pin into the housing. The gear must be positioned so the dowel pin is aligned with case cutout as shown.
12. Check to confirm that the dowel pin is even with or slightly above the cutout in the lock housing.
13. Refer to Figure 7-58. Place the pole clamp bracket onto the lock housing. (If done in this manner the gear cannot fall out.)
14. Hold the bracket and lock housing together as you thread the pole clamp knob shaft through the lock housing, spring clutch, and bracket until the shaft extends out about 1/4” to 1/2”.

NOTE: In the next step, the assembly must be tilted back with the lock housing down so the drive gear does not fall out.

15. Refer to Figure 7-58. Slide the lock housing slightly away from the pole clamp bracket and verify that the spring is flush with the bracket with no gap between the spring coils. If necessary, reposition the spring coils.

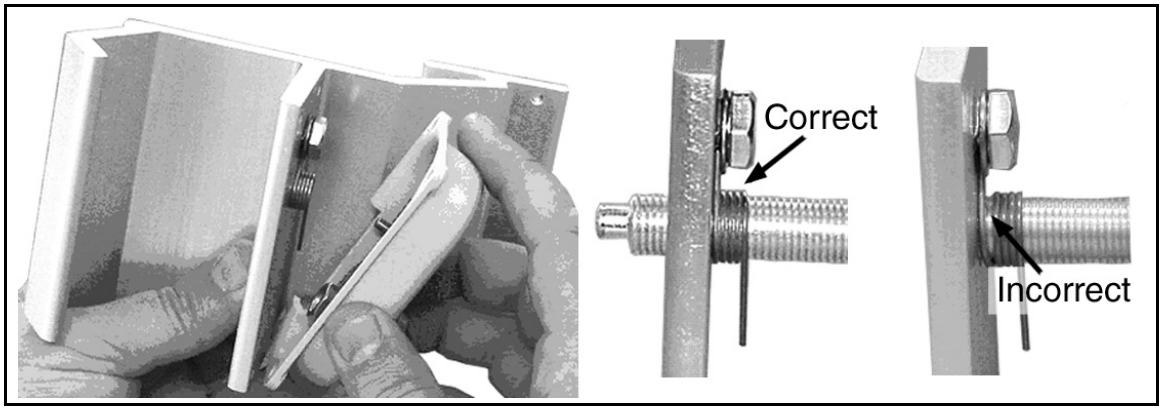


Figure 7-58. Bracket & Lock Housing Assembly

16. While holding the bracket and lock housing together, insert and fully rotate the key to the UNLOCK position.
17. Turn the knob in both a clockwise and counterclockwise direction, and ensure that the knob rotates freely.
18. Apply Loctite 425 to the threads of four, tamper-resistant screws and insert them through the lock housing into the bracket.
19. Use a # 4 spanner driver to tighten all four screws to a torque of 7.0 ± 0.7 in-lb.
20. Rotate the knob clockwise until the shaft is fully extended into the pole clamp, then use a small swab to apply a very light coating of silicone grease to the threads.
21. Rotate the knob counterclockwise until the shaft threads are even with the bracket, then wipe off any excess silicone grease.
22. Rotate the knob clockwise until 1/4" to 1/2" of threaded shaft extends from the bracket.

23. Refer to Figure 7-59. Note the difference between the old style and new style pole clamp shafts and install the 5/16" retaining ring in the notch nearest the threads on the new style shaft. (Verify that the ring is completely seated in the groove.)

NOTE: The tip pad installed in the next step may be one of two types. If, when looking into the pad, one side has a deeper indentation than the other, the deep side should be facing up when installed. If both sides are of equal depth, either side may face up when installed.

24. Refer to Figure 7-59. Place the pole clamp tip pad onto the end of the pole clamp knob shaft and attach a 3/16" retaining ring inside the pad and into the groove at the end of the shaft. (Verify that the ring is completely seated in the groove.)

25. Refer to Figure 7-60. If needed, wipe the surfaces of the pole clamp bracket and the lock housing and install the pole clamp locking label and the warning label in the locations shown.

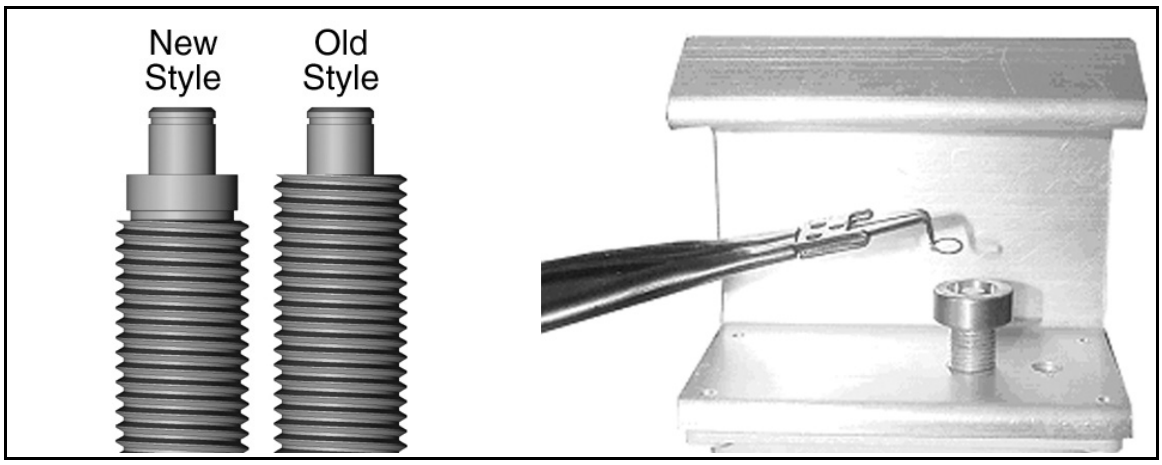
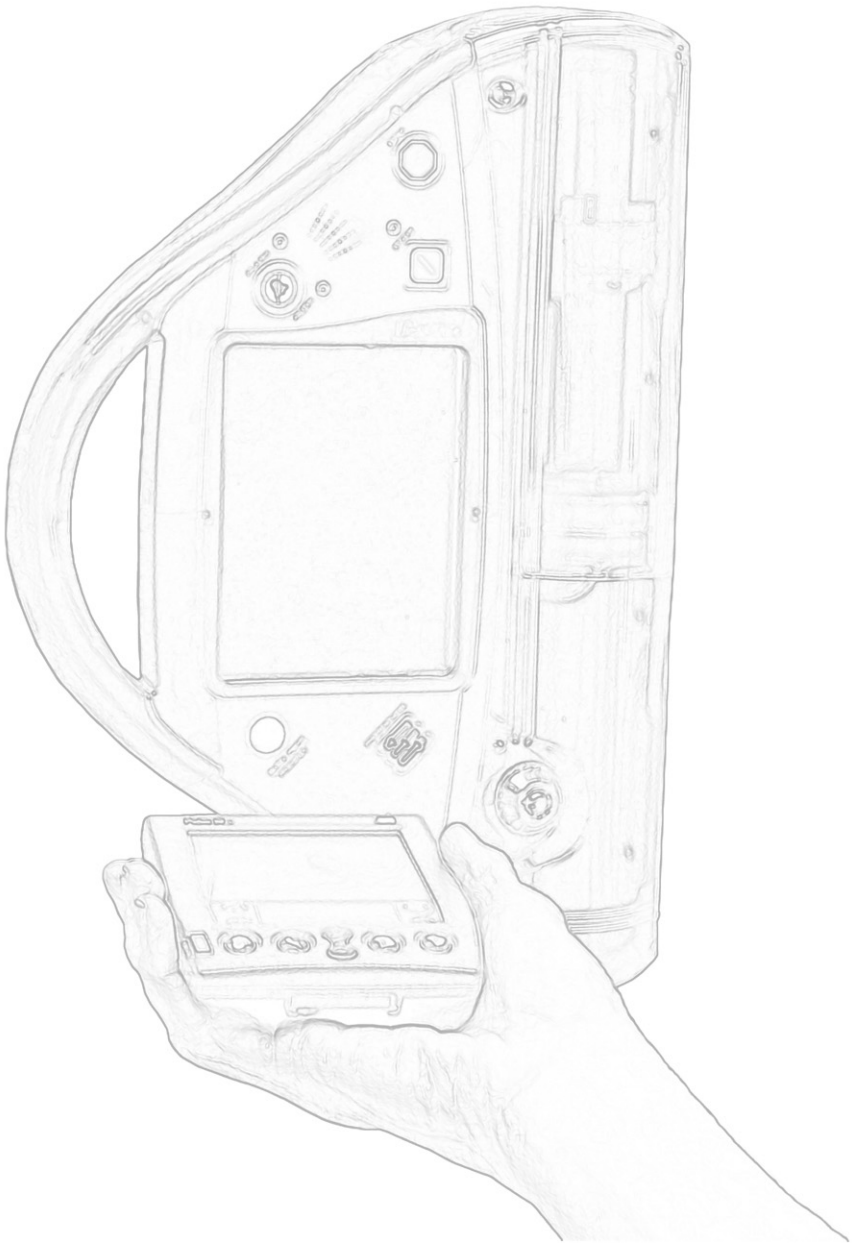


Figure 7-59. Pole Clamp Tip Pad Installation

WARNING
Severe injury or death may result from using sets and syringes other than those listed in the user's guide. Always read and follow the instructions in the user's guide and those accompanying the set and syringe.
MISE EN GARDE
LOCK
07-26-26-487

Figure 7-60. Label Positioning



8 - Post Repair Checkout Procedure

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Overview

This section contains the checkout procedures which must be conducted after any repair has been made to the pump and prior to putting the pump back in service.

If the repair involved the pump's sensors, the pump must be calibrated using the Pump Calibration & Verification Procedure in Section 6 prior to performing this post repair checkout.

These test procedures should be conducted in the order they are presented.

These test procedures assess the correct functionality and performance of the hardware's sensors, delivery rate, and moving mechanical parts.

These procedures are applicable to the Syndeo PCA Syringe Pump, product code 2L3113.

Materials Needed

DESCRIPTION	QUANTITY
3-way stop cock	1
20ga to 22ga needle or catheter	1
60 cc B-D or MONOjECT syringes	As needed
Administration set 2L3508 or 2C9205	1
Calibrated analytical balance with three decimal resolution	1
Calibrated digital fluid compatible pressure meter	1
Calibrated stopwatch	1
Collection container	1
D-Cell Alkaline batteries	4
DC Battery Pack	1
Ohmmeter	1
Optional countdown timer	1
Palm PDA model M125, M130, or M515 with Palm OS 4.0, 4.1, or higher	1
Syndeo PCA button	1
Tubing extension set	1
Water	As needed

Table 8-1. Materials Needed

Visual Inspection

RS-232 Connector Check

The RS-232 wire harness is the last item connected to the interface board during pump assembly. This test insures the connection did not come lose during the process. If this test does not pass, disassembly of the pump will be required.

1. Connect an ohmmeter across pins 5 and 8 on the DB9 connector at the rear of the pump.
2. A reading of 1K ohms indicates that the RS-232 wire harness is connected properly.
3. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.

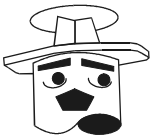
External Inspection

1. Record the Serial Number shown on the back of the pump on the *Post Repair Checkout Data Sheet*.
2. Inspect the pump housing, syringe door, battery pack, pole clamp, PCA Button, and display for any signs of defects, damage, or hazards that might affect pump performance.
3. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.

D-Cell Battery Pack Check

NOTE: Always use Duracell (MN1300) or Duracell ProCell (PC1300) D-Cell alkaline batteries having a date code greater than six years from the date of initial installation. (For example, batteries installed in 2004 should have a "use by" date of at least 2010.) The use of other alkaline battery brands may adversely affect the pump's battery life. Dispose of used alkaline batteries in accordance with local regulations.

1. Press the release button to disengage and remove the battery pack from the pump.
2. Open the battery pack and install four known good batteries with the proper date code.



HINT: Check the condition of the battery pack electrical contacts (internal and external) as well as the mating connectors on the pump housing. If needed, use a pencil eraser to carefully clean these contacts.

3. Ensure the batteries are installed with proper polarity, then attach the battery pack cover.

CAUTION Installing batteries with incorrect polarity may lead to battery leakage and cause a hazardous condition.

4. Slide the battery pack into the pump and ensure it latches (clicks) into place.
5. Verify that the battery pack latch engages properly.
6. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.

Pole Clamp & Lock Check

1. With the pole clamp unlocked, turn the pole clamp knob counterclockwise until the clamp shaft is just short of reaching its fully extended position.
2. Turn the knob clockwise until the clamp shaft position is about halfway towards the V-shaped bracket.
3. Use a key to lock the pole clamp and then ensure the knob still turns clockwise but does not turn counterclockwise.
4. Unlock the pole clamp and continue turning the knob clockwise until the end of travel is reached.
5. Turn the knob counterclockwise until the clamp shaft is approximately ½ inch away from the V-shaped bracket.
6. The pole clamp should move easily through its full range of travel and the lock must keep the clamp from rotating counterclockwise.
7. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.

Pusher Block Motion Check

1. Unlock the syringe compartment door and remove any installed syringe.
2. Fully squeeze the pusher block release lever and verify full movement of the pusher block assembly over the complete range of travel.
3. Release the lever and make sure the pusher block locks into position. The pusher block should not move freely.
4. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.

Syringe Loading Check

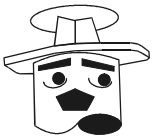
1. Fully squeeze the pusher block release lever and move it to the fully extended position.
2. Load a syringe by sliding it under the barrel clamp, making sure the flange is properly positioned in the slot.
3. Fully squeeze the release lever and move the pusher block until it is against the syringe plunger.
4. Release the lever so that the plunger retainers on the underside capture the syringe plunger and ensure the pusher block latches in place and does not move.
5. Verify that the barrel clamp and flippers operate correctly and allow the syringe to be properly loaded.
6. Remove the syringe from the pump.
7. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.

Power-ON Self Test & Date/Time Check

NOTE: During this procedure, a few unique display screens may occur.

- If asked “Do you want to resume the existing therapy?”, press NO.
- If asked “Do you want to clear patient history?”, press YES.
- If the "Programming Incomplete" screen appears, press OKAY.
- If asked for the Security Code, enter the 3-digit code and press ENTER. (The default is 123 - your code may differ.)

NOTE: The Power ON/OFF button must be held down for approximately three seconds for the pump to turn OFF.



HINT: If the display screen is not touched for a period of one minute, it will go blank. Press anywhere on the display screen to reactivate it.

1. With the pump turned OFF, press and release the Power ON/OFF button to turn the pump ON. (Leave the syringe compartment door unlocked.)
2. Verify that the pump successfully completes the Power-ON Self Test (POST) with the indications listed below.
   - The ALARM (red), ALERT (yellow), and INFUSION (green) lights briefly flash ON then OFF.
   - The buzzer sounds two long tones.
   - The display screen turns white, then black.
   - Three different audible tones sound from the speaker.
   - The buzzer sounds one short tone.
   - The “Power Up Complete” message appears at the top of the display.

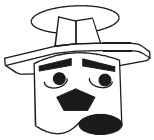
3. Record Power-ON Self Test PASS or FAIL on the *Post Repair Checkout Data Sheet*.
4. The screen prompt asks "Are the Date and Time correct?" If correct, continue to step 5. If not correct, press NO, then follow the screen prompts to enter the correct date and time.
5. When the date and time are correct, record the values shown on the screen on the *Post Repair Checkout Data Sheet*.
6. Now that the date and time are correct, press YES.
7. Follow the screen prompts to close and lock, then unlock the syringe compartment door.
8. The "Load Syringe" screen appears. (DO NOT load a syringe at this time!)

Pump Preferences

1. Press the PREFERENCES button to access the pump's display features.
2. Use the UP and DOWN arrows to select the "Volume" feature, then press ENTER.
3. Use the "+" and "-" keys to increase or decrease the speaker volume (listen to the volume of the three tones).
4. Verify that the volume changes, set the volume for the best sound level, then press the ENTER key. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
5. Select the "Brightness" feature, then press ENTER.
6. Use the "+" and "-" keys to increase or decrease the display brightness.
7. Verify that the screen changes brightness levels, set the brightness to about two-thirds of full brightness, then press the ENTER key. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
8. Select the "Contrast" feature, then press ENTER.
9. Use the "+" and "-" keys to increase or decrease the display contrast.
10. Verify that the contrast level changes, set the contrast for the best visibility, then press the ENTER key. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
11. Select the "Pump Identifiers" feature, then press ENTER.
12. Verify the Pump Serial Number shown on the display matches the serial number on the rear housing. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
13. Record the Master Software Version and the Safety Software Version on the *Post Repair Checkout Data Sheet*.
14. Press BACK to return to the PREFERENCES screen.
15. Open the syringe door and press the Power ON/OFF button to turn the pump OFF.

Sensor, Switch, & Button Verification

1. Press and hold the HISTORY button while pressing the Power ON/OFF button to turn the pump ON. Continue to hold the HISTORY button until the Security Code screen appears. Enter the Security Code of 31415. This will bring up the Service Mode screen.



HINT: There are more features for the Service Mode screen than can be displayed at one time. Use the SCROLL UP or SCROLL DOWN keys as needed to access these additional features.

2. Use the SCROLL UP or SCROLL DOWN keys to highlight the "Pump Info" feature, then press ENTER.
3. Record the displayed values for Total Time Powered On, Total Therapy Time, Total Volume Pumped, Total Syringes Loaded, and Total Therapies Run onto the *Post Repair Checkout Data Sheet*.
4. Press BACK to return to the Service Mode screen.
5. Highlight the "Hardware Status" feature, then press ENTER.
6. Refer to Table 8-2. With no syringe in the pump, and while viewing the display screen, activate and release each item listed to ensure they function properly.

Feature	Location	Inactive	Active
Flange Sensor	Press and release the flange sensor bar.	Not Present	Present
Barrel Sensor	Press and release the sensor in the bottom of the housing near the flange sensor bar.	Not Present	Present
Thumb Press Sensor	Press and release the sensor in the center of the pusher block.	Not Captured	Captured
Rotary Nut Sensor	Squeeze and release the pusher block release lever to release and capture the drive screw.	Not Engaged	Engaged
Syringe Door Sensor	Lock and unlock the syringe door.	Unlocked	Locked
PCA Cable	Connect and disconnect the PCA cable at the rear of the pump.	Not Connected	Connected
PCA Button	Press and release the button.	Not Pressed	Pressed
MUTE Button	Press and release the button.	Not Pressed	Pressed
STOP Button	Press and release the button.	Not Pressed	Pressed
START Button	Press and release the button.	Not Pressed	Pressed
HISTORY Button	Press and release the button.	Not Pressed	Pressed
PREFERENCES Button	Press and release the button.	Not Pressed	Pressed

Table 8-2. Hardware Status Features

7. Press BACK to return to the Service Mode Screen. Record PASS or FAIL in the appropriate areas of the *Post Repair Checkout Data Sheet*.

Internal Voltage Verification

NOTE: Perform these checks only if the global brain board or the interface board have been replaced.

1. On the Service Mode screen highlight "Functional Test" and press ENTER.
2. Press RATE and enter a rate of 99.9 mL/hr, and press ENTER.
3. Press VTBI and enter a volume of 45 mL, and press ENTER.
4. Move the pusher block to its highest position.
5. Press the START button to begin a simulated infusion.
6. Verify that the "Volume Infused" indication on the display screen begins to increase as the pump simulates an infusion.
7. Press BACK to return to the Service Mode screen.
8. Highlight "Internal Voltages" and press ENTER.
9. Verify that while the unit is actually pumping (motor pulsing), the Encoder voltage is within the range given on the *Post Repair Checkout Data Sheet*. When not pumping (motor not pulsing), this voltage reading should be approximately 0.13 volts. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
10. Press the STOP button, then press the BACK key to return to the Service Mode screen.
11. Select the INTERNAL VOLTAGE option again, and press ENTER.
12. Record the Vmain value displayed at the top of the screen on the *Post Repair Checkout Data Sheet* as a reference with the pump stopped.
13. While the pump is stopped, note the actual voltages listed on the pump's display and verify the levels are within the voltage ranges shown on the *Post Repair Checkout Data Sheet*. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
14. Press BACK to return to the Service Mode screen.
15. Open the syringe door and press the Power ON/OFF button to turn the pump OFF.

Continuous Mode Accuracy Test

1. Fill a 60 cc syringe with water to a level between the 50 cc and 60 cc marks and purge all air bubbles from the syringe. Attach an administration set with a 20 or 22 ga needle or catheter, 1 to 2 inches long.
2. Manually prime the syringe set until there are no air bubbles, and fluid is flowing from the needle.

NOTE: When performing this test for a quantity of pumps, a syringe may be re-used up to 20 times. To track the number of uses for a given syringe, it is recommended that a mark be placed on the syringe each time it is used in this manner.

3. Press the Power ON/OFF button to turn the pump ON. Press YES at the Power Up Complete screen.
4. When the display indicates, close and lock the syringe door.

5. When the display indicates, open the syringe door and load the syringe into the pump.

   If asked “Do you want to resume the existing therapy?” press NO.
   If asked “Do you want to clear patient history?” press YES.

6. Select the proper 60 cc syringe from the display. Press YES to confirm the syringe size.
7. Load the 60 cc syringe and administration set properly by capturing the syringe plunger with the flippers, and securing the barrel by means of the barrel clamp and syringe flange catch.
8. Press the START button to begin.
9. The Prime Pump window should be displayed. Direct the output of the set to a fluid discard container or drain.
10. Press YES in answer to the displayed “Do you want to prime the pump?”
11. Open and close the syringe door per the display prompts.
12. When finished, the pump will ask “Is priming completed?” Continue priming by pressing NO, to prime a total of at least 4 times, for a Volume Primed of 2.0 mL shown on the display, to ensure there are no air bubbles in the set.
13. After priming 4 times, press YES in answer to the “Is priming completed?” question.
14. Once primed, open the door and turn the pump OFF.
15. Enter the Service Mode by holding the HISTORY button down while turning the pump ON. Enter the Security Code (31415).
16. Select the Functional Test.
17. On the Functional Test screen, press the "Syringe" key, then select the B-D 60 cc.
18. Press the “Rate” key and enter a Rate of 99.9, then press ENTER.
19. Press the “VTBI” key and enter a VTBI of 30, then press ENTER.
20. Close and lock the syringe door.
21. Insert the needle/catheter into a clean, dry collection container. Start the infusion by pressing the START button. Verify that the pump is infusing the distilled water by observing fluid flowing from the needle and that the green LED is flashing.
22. The green LED will stop flashing when the infusion is completed, in approximately 18 minutes.
23. Collect the total volume infused.
24. Zero the empty scale by pressing the tare button. Then weigh the filled collection container. When the reading stabilizes, tare the scale with the collection container still on it. (The scale will retain the original measurement of container plus fluid.)
25. Empty the fluid from the container and dry with a towel. Return the dry container to the scale. (The scale will subtract the difference and will display the total amount of fluid delivered.)
26. Record the amount delivered. Verify the weight of the fluid is within the range given on the *Post Repair Checkout Data Sheet*. This range is established for water density of 0.998 g/mL at 21º C (70º F). Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.

Occlusion Test

1. Without turning the pump OFF, remove the syringe.
2. Fill the syringe with water to approximately the 40 cc mark.

NOTE: When performing this test for a quantity of pumps, a syringe may be re-used up to 8 times. To track the number of uses for a given syringe, it is recommended that a mark be placed on the syringe each time it is used in this manner.

3. Load the syringe and attach a 3-way stopcock to the distal end of the set. Connect a pressure gauge/meter to one of the valves and an extra tubing extension set to the other valve. Place the extension set into a collection container and turn the valve such that the fluid can vent into the container.
4. With both the pump set line and the pressure meter vented to the open container, zero the pressure meter. Then set the pressure meter to retain the maximum pressure.
5. With the pump still in the Functional Test mode from the accuracy test above, restart the pump by pressing START. Allow the pump to infuse until fluid is flowing completely through the stopcock.
6. While the pump is infusing, turn the stopcock such that the fluid flows to the pressure meter rather than into the collection container.
7. After a few minutes, the pump should sound and display a DOWNSTREAM OCCLUSION alarm on the LCD, and the red alarm LED should be flashing. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
8. Record the highest-pressure value seen on the meter. Verify the occlusion value is within the range given on the *Post Repair Checkout Data Sheet*. If the pressure is greater than the upper limit, replace the syringe with a new one and repeat this procedure. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
9. ALARM Silence - Clear/silence the alarm but do not turn the pump OFF. Verify the alarm silences.
10. Relieve the pressure in the syringe by venting the fluid into the collection container.
11. Open the syringe door, remove the syringe, and turn the pump OFF.

PCA Accuracy & Button Test

NOTE: The PCA Button assembly must be plugged into the back of the pump for the following test.

1. Fill a 60 cc syringe with water to a level between the 50 cc and 60 cc marks and purge all air bubbles from the syringe. Attach an administration set with a 20 or 22 ga needle or catheter, 1 to 2 inches long.
2. Manually prime the syringe set until there are no air bubbles, and fluid is flowing from the needle.

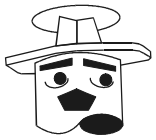
NOTE: When performing this test for a quantity of pumps, a syringe may be re-used up to 20 times. To track the number of uses for a given syringe, it is recommended that a mark be placed on the syringe each time it is used in this manner.

3. Press the Power ON/OFF button to turn the pump ON. Press YES at the Power Up Complete screen.

4. When the display indicates, close and lock the syringe door.
5. When the display indicates, open the syringe door and load the syringe into the pump.

   If asked “Do you want to resume the existing therapy?” press NO.
   If asked “Do you want to clear patient history?” press YES.
6. Select the proper 60 cc syringe from the display. Press YES to confirm the syringe size.
7. Load the 60 cc syringe and administration set properly by capturing the syringe plunger with the flippers, and securing the barrel by means of the barrel clamp and syringe flange catch.
8. Press the START button to begin.
9. The Prime Pump window should be displayed. Direct the output of the set to a fluid discard container or drain.
10. Press YES in answer to the question “Do you want to prime the pump?”
11. Open and close the syringe door per the display prompts.
12. When finished, the pump will ask “Is priming completed?” To ensure there are no air bubbles in the set, press NO to continue priming a total of at least 4 times for a Volume Primed of 2.0 mL.
13. After priming 4 times, press YES in answer to “Is priming completed?”
14. Select the PCA Only mode.
15. Select and confirm mL as the units.
16. Program the pump for the following:

    PCA Dose: 9.9 mL
    Lock out: 3 minutes
    1 Hour Limit: 30 mL
17. Confirm the settings and prescription.
18. Answer YES to the question “Do you want to program a Loading Dose?”
19. Enter a loading dose of 9.9 mL and confirm the dose, but **DO NOT PRESS START!**
20. Empty out and dry the clean collection container. Place the administration set with the needle back into the collection container to collect the fluid so that the fluid weight can be measured.
21. Press the START button. The display will show “Loading Dose Infusing”.
22. Once the loading dose is done, the pump will beep and the yellow LED will flash. The screen will show Loading Dose Completed.
23. Press OKAY to continue, then press START.



HINT: Optional - for convenience, start a countdown timer for 3 minutes to indicate the end of the lock out time.

24. After the 3 minute programmed lock out time, initiate a PCA bolus by pressing the PCA cable button.
25. After the PCA bolus is delivered (in approximately 3-4 minutes) and fluid has stopped dripping, press STOP.
26. Press CLINICIAN BOLUS, enter the Security Code (123), and set Clinician Bolus to 9.9 mL. Confirm the Bolus by pressing OKAY.
27. Press START. The green LED above the START button will start flashing.
28. When the Clinician Bolus is completed, the pump will beep once and the yellow alert LED will flash.
29. Press OKAY then collect the total volume infused.
30. Zero the empty scale by pressing the tare button. Then weigh the filled collection container. When the reading stabilizes, tare the scale with the collection container still on it. (The scale will retain the original measurement of container plus fluid.)
31. Empty the fluid and dry the container, then place the dry container on the scale. (The scale will subtract the difference and will display the total amount of fluid delivered.)
32. Record the amount delivered. Verify the weight of the fluid is within the range given on the *Post Repair Checkout Data Sheet*. This range is established for a water density of 0.998 g/mL at 21º C (70º F). Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.

Power Loss Test

1. With the pump turned ON, remove the battery pack from the back of the pump such that there is no power to the pump. Verify the loss of power response by confirming that the pump intermittently issues an audible alert and flashes the red LED. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
2. Insert the battery pack back into the pump and press the MUTE button to silence the audible alert and stop the flashing LED.

IrDA Interface Test

1. Press and hold the HISTORY button while pressing the Power ON/OFF button to turn the pump ON. Continue to hold the HISTORY button until the Security Code screen appears. Enter the Security Code (31415). This will bring up the Service Mode screen.
2. If required, press YES to clear patient history.
3. Press the UP arrow on the Service Mode screen to highlight the "IrDA Test" feature and press ENTER.
4. On the Options display, press the PDA icon "UPLOAD" to select communication with that device.
5. Turn on a PDA device and press HOME if necessary to bring up the Main Menu.
6. Align the IrDA port of the PDA or printer with the pump's IrDA port and press the OKAY key on the pump display to begin the information transfer. The pump display will go black and the data transfer will begin.

NOTE: If the IrDA test is started and the PDA is not in place, a "Retry?" screen will appear which permits one to try again or exit from this feature.

7. Both devices MUST remain aligned until the transfer of information is complete.
8. The data transfer will start and stop automatically. When the transfer of data is complete, the pump display will turn back on and show the "Report Complete" screen.

NOTE: If the pump display does not turn ON after the data transfer is completed, touch the LCD screen.

9. After the data transfer, the PDA display will ask, "Do you want to accept . . .?"
10. Select "YES" on the PDA display, to accept the message into the PDA.
11. To ensure the test transmission completed successfully, access the PDA Memo Pad feature and display the message contents. Record PASS or FAIL on the *Post Repair Checkout Data Sheet*.
12. Turn off the PDA device to conserve its power. (Delete the IrDA test message from the PDA when it is no longer needed.)
13. To complete this test, open the syringe door, remove the syringe, and turn the pump OFF.

Turn to Section 6 in this manual and perform the Pump Calibration & Verification Procedure.

Post Repair Checkout Data Sheet

Syndeo PCA Syringe Pump

Pump S/N:_____

DESCRIPTION	Circle PASS or FAIL	
RS-232 Connector	PASS	FAIL
External Inspection	PASS	FAIL
Battery Pack latches properly	PASS	FAIL
Pole Clamp operates smoothly over entire range of travel	PASS	FAIL
Pusher Block moves fully	PASS	FAIL
Syringe Loading mechanics function properly	PASS	FAIL
Power-ON Self Test: • All three LED's flash or flicker. • The buzzer sounds two long tones. • The display screen turns white, then black. • Three different audible tones sound from the speaker. • The buzzer sounds one short tone. • The "Power Up Complete" message appears at the top of the display.	PASS	FAIL
Screen Displayed DATE: Screen Displayed TIME:		
Speaker Volume feature	PASS	FAIL
Display Brightness feature	PASS	FAIL
Display Contrast feature	PASS	FAIL
Pump Serial Number	PASS	FAIL
Master Software Version:		
Safety Software Version:		
Time Log values: Total Time Powered On: _____ Total Therapy Time: _____ Total Volume Pumped: _____ Total Syringes Loaded: _____ Total Therapies Run: _____		
Flange Sensor, Barrel Sensor, and Thumb Press Sensor all operate properly	PASS	FAIL
Rotary Nut Sensor operates properly	PASS	FAIL
Syringe Door Sensor operates properly	PASS	FAIL
PCA Cable and PCA Button operate properly	PASS	FAIL

Tested by: _____ Date: _____

Post Repair Checkout Data Sheet

Pump S/N:_____

DESCRIPTION			Circle PASS or FAIL	
All Front Panel Buttons operate properly			PASS	FAIL
While pumping:	Encoder	4.70 to 5.36	PASS	FAIL
While stopped:	Record Vmain =		Reference	
While stopped:	Vtemperature	NA	NA	NA
	3Vvdd	3.1 to 3.5	PASS	FAIL
	Master 3.3V	3.1 to 3.5	PASS	FAIL
	Master 2.5V	2.3 to 2.8	PASS	FAIL
	Master ADC ref	2.9 to 3.1	PASS	FAIL
	Master DAC ref	2.9 to 3.1	PASS	FAIL
	Sensor 5V	4.8 to 5.3	PASS	FAIL
	PLDO saf	3.1 to 3.5	PASS	FAIL
	Motor minus saf	NA	NA	NA
	Safety 3.3V	3.1 to 3.5	PASS	FAIL
	Safety ADC ref	2.9 to 3.1	PASS	FAIL
	PLDO 3.3V	3.1 to 3.5	PASS	FAIL
	D-Cell	3.9 to 6.5	PASS	FAIL
	Encoder	NA	NA	NA
	Pump current	NA	NA	NA
	Vmain (regulator)	4.8 to 5.3	PASS	FAIL
Continuous Mode Accuracy Test: Fluid Accuracy +/- 4.75% (28.518 to 31.362 g) Fluid weight: _____ g.			PASS	FAIL
Occlusion Tests: Occlusion alarm: visual display, audible tone, and red LED flashing.			PASS	FAIL
Occlusion Pressure value (10.00 to 20.00 psi): _____ psi.			PASS	FAIL
PCA Mode Accuracy Test: Fluid Accuracy +/- 4.75% (28.233 to 31.049 g) Fluid Weight: _____ g.			PASS	FAIL
Loss of Battery Response: audible tone and red LED flashing.			PASS	FAIL
IrDA Test Screen transmitted successfully			PASS	FAIL
Any service codes occurred during test?		Circle PASS if no Service Codes occurred during testing. Record any Service Codes below.	PASS	FAIL
Any abnormalities occurred during test?		Circle PASS if no Abnormalities occurred during test. Record any observations below.	PASS	FAIL

Tested by: _____ Date: _____

9 - Electronic Assembly Drawings

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Overview

This section contains the wiring diagrams of the keypads and switch membranes and all interconnecting wiring harnesses used in the Syndeo pump. In addition, illustrations of all the individual flex circuits and their wiring diagrams are included.

Connector references are for locations on the interface board unless otherwise indicated.

Membranes

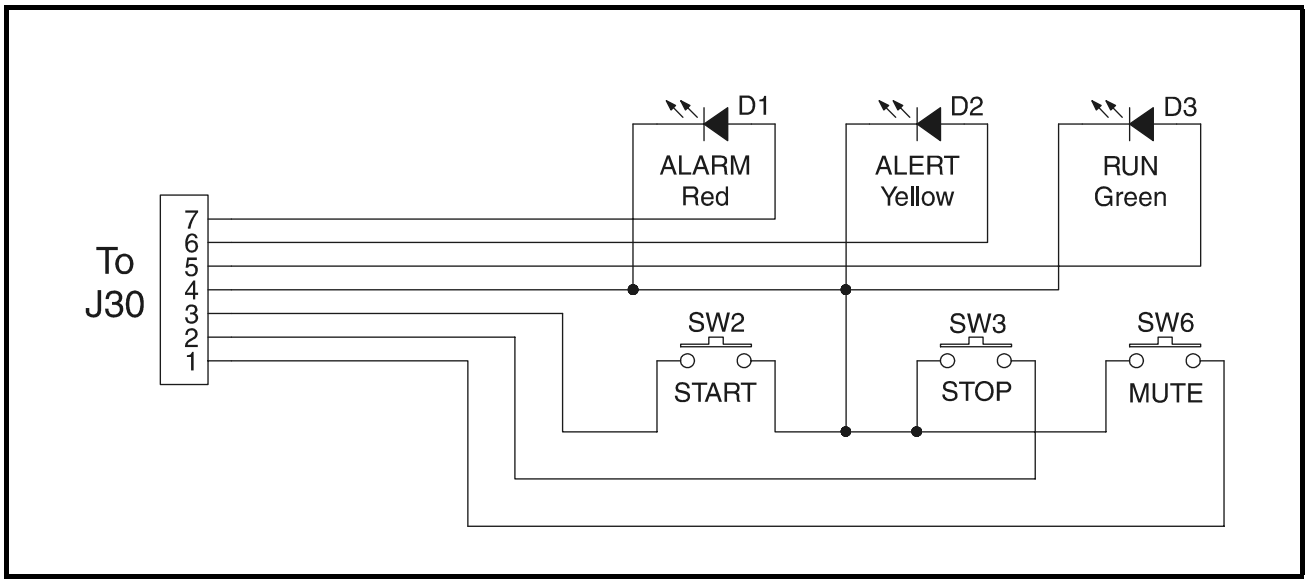


Figure 9-1. Top Keypad Membrane (B089110000)

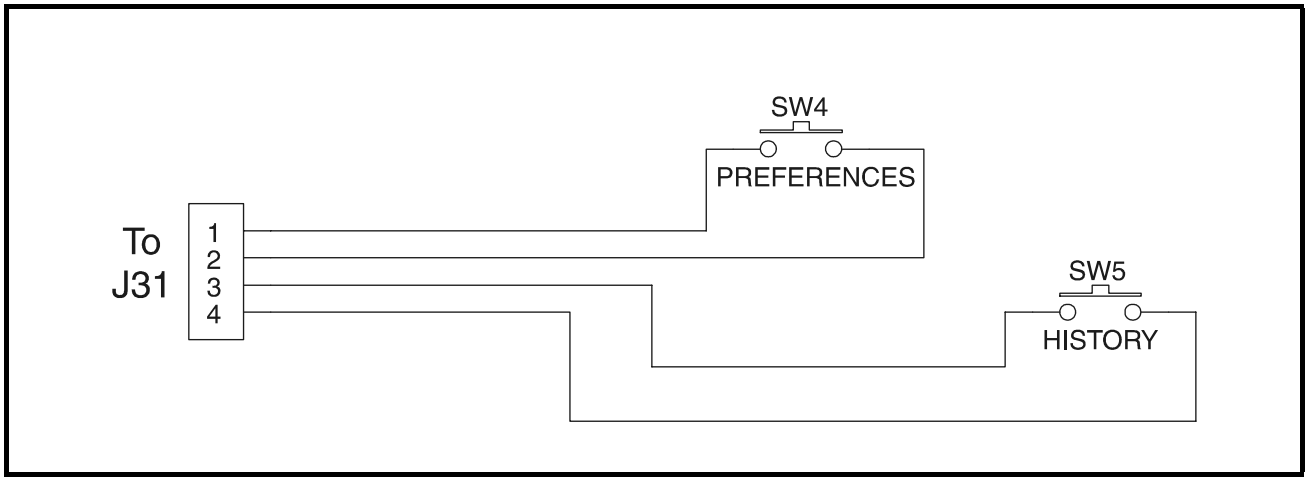


Figure 9-2. Bottom Keypad Membrane (B089110001)

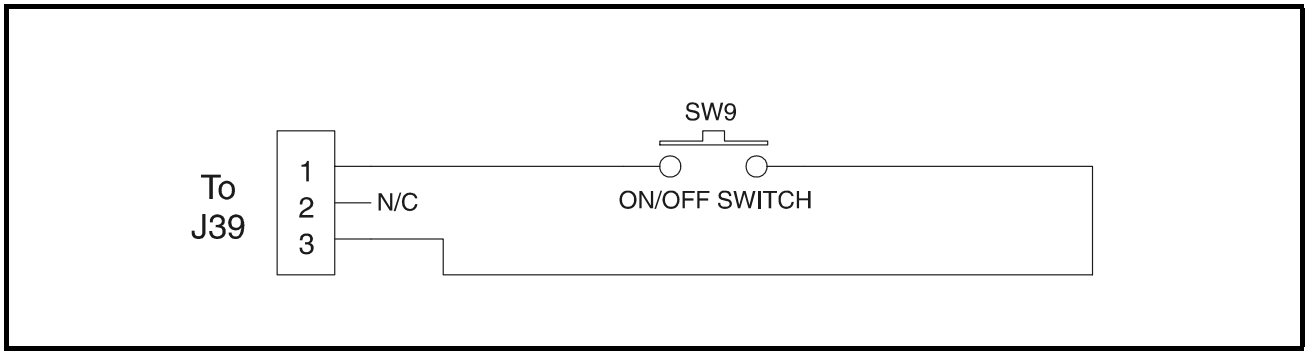


Figure 9-3. Power Switch Membrane (B089474000)

Wiring Harnesses

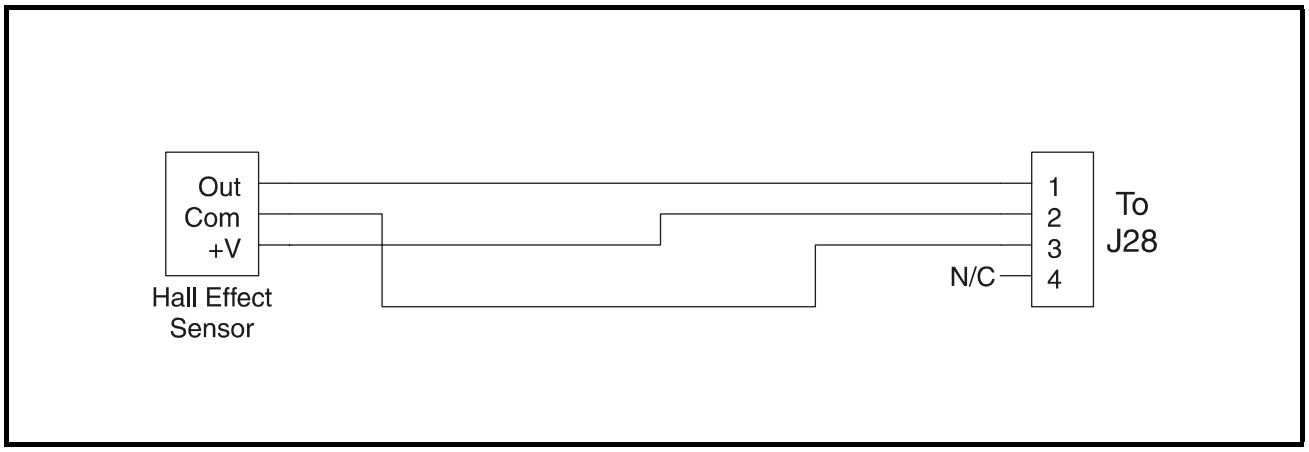


Figure 9-4. Door Sensor Harness (B089140010)

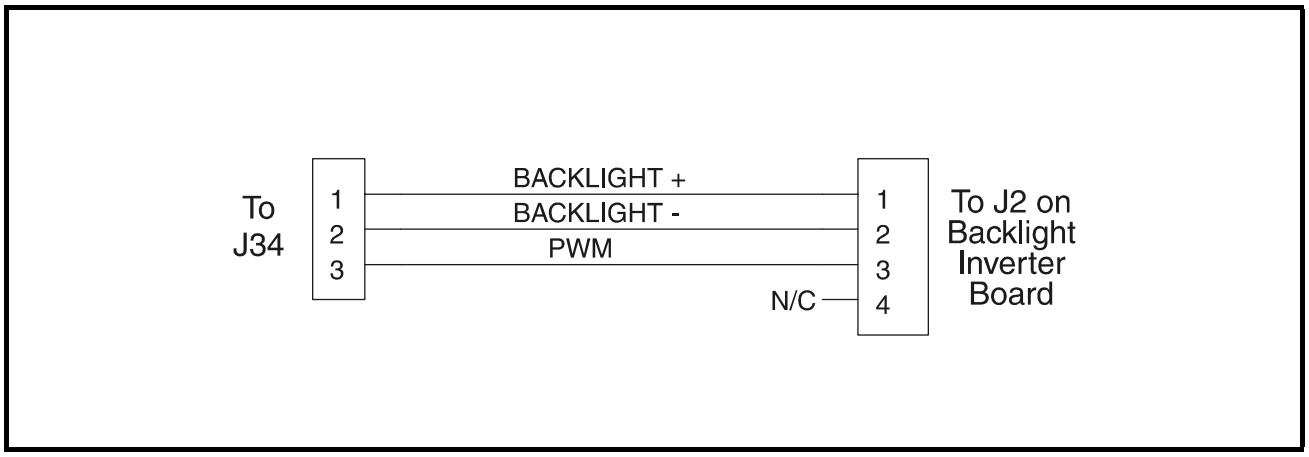


Figure 9-5. Backlight Inverter Harness (B089140017)

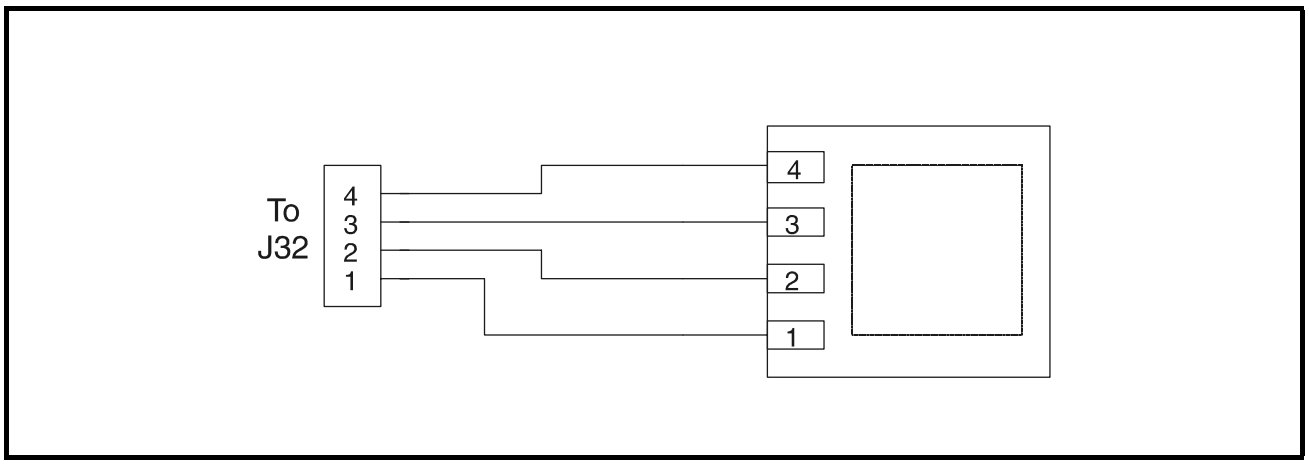


Figure 9-6. Power Board Harness (B089110003)

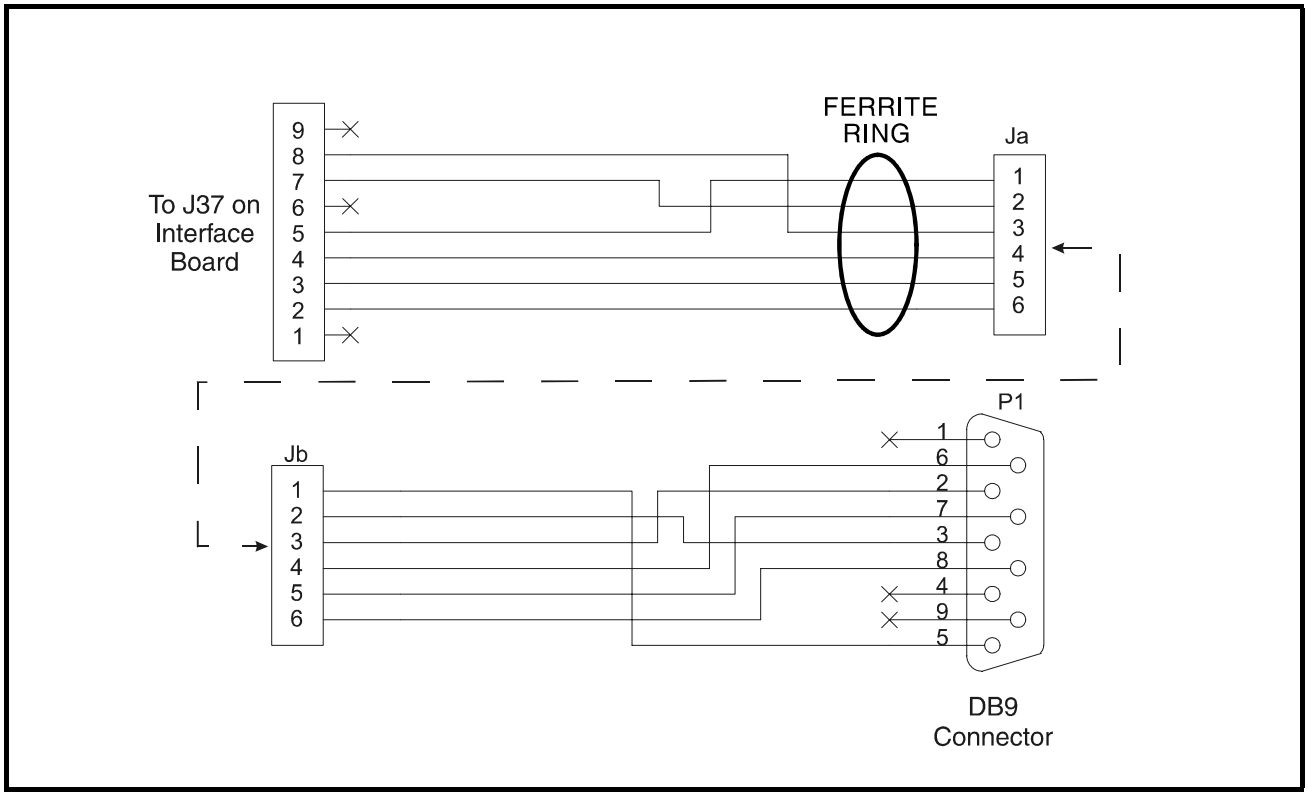


Figure 9-7. RS-232 Ferrite Ring Harness (B089140022) and RS-232 Connector Harness (B089140009) - For Future Use -

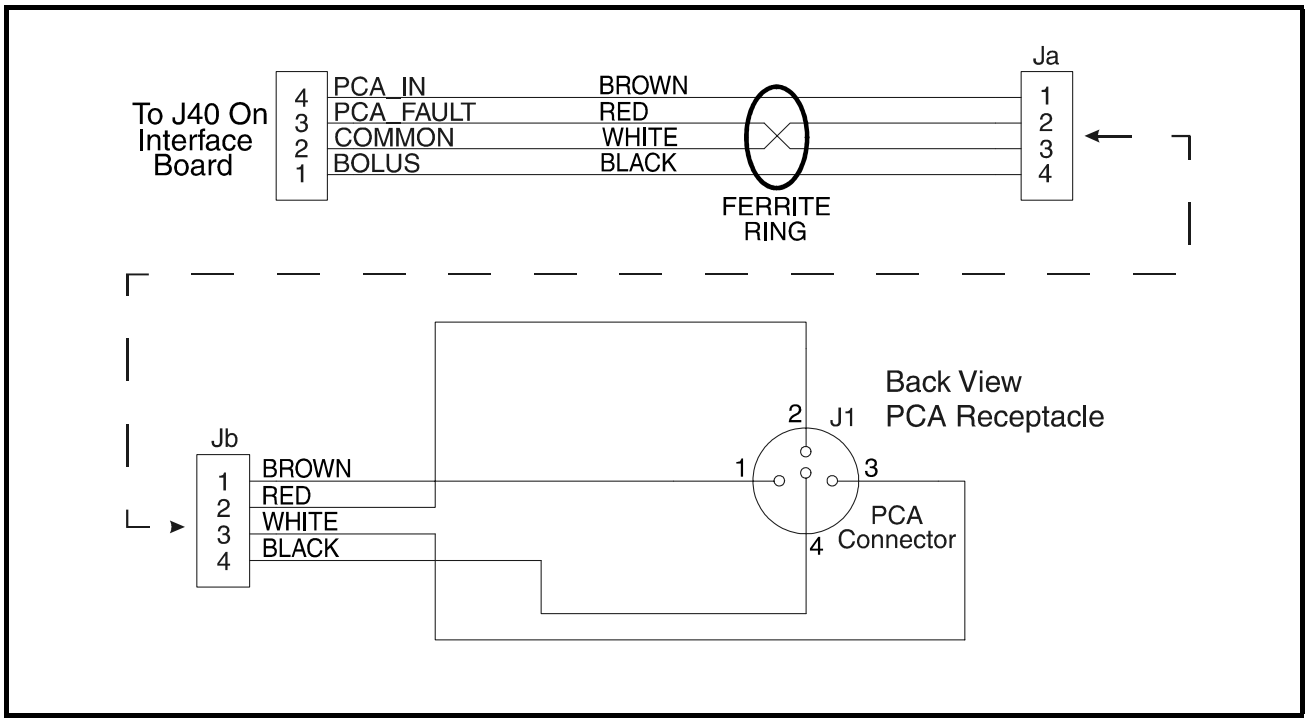


Figure 9-8. PCA Ferrite Ring Harness (B089140020) and PCA Connector Harness (B089140011)

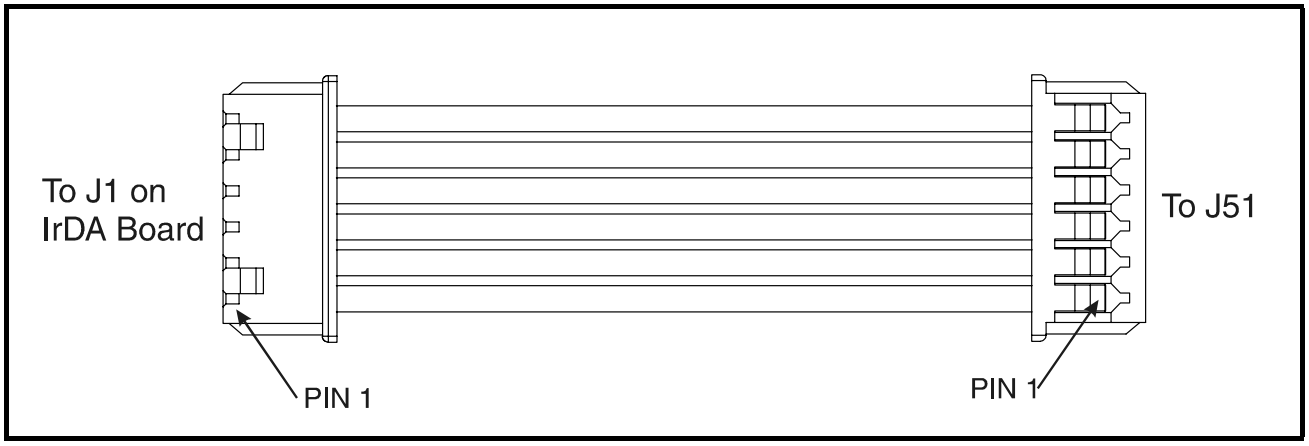


Figure 9-9. IrDA Harness (B089140021)

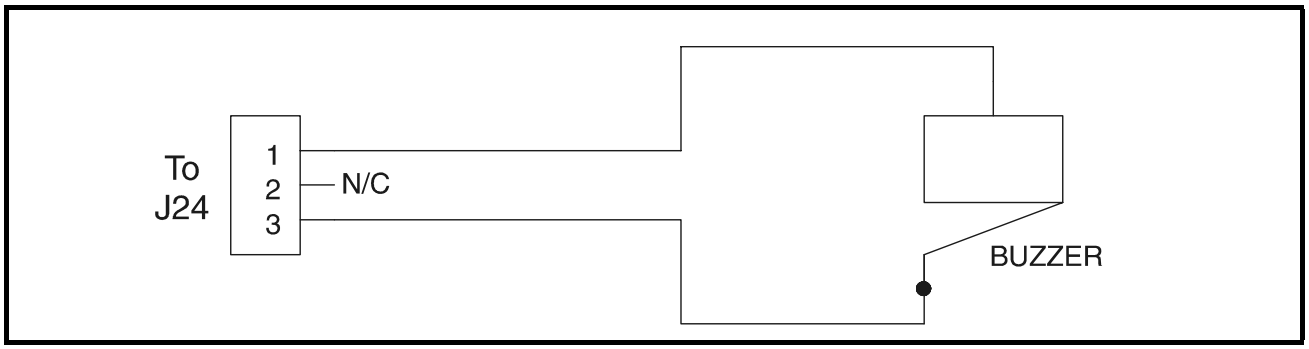


Figure 9-10. Backup Buzzer Harness (B089140016)

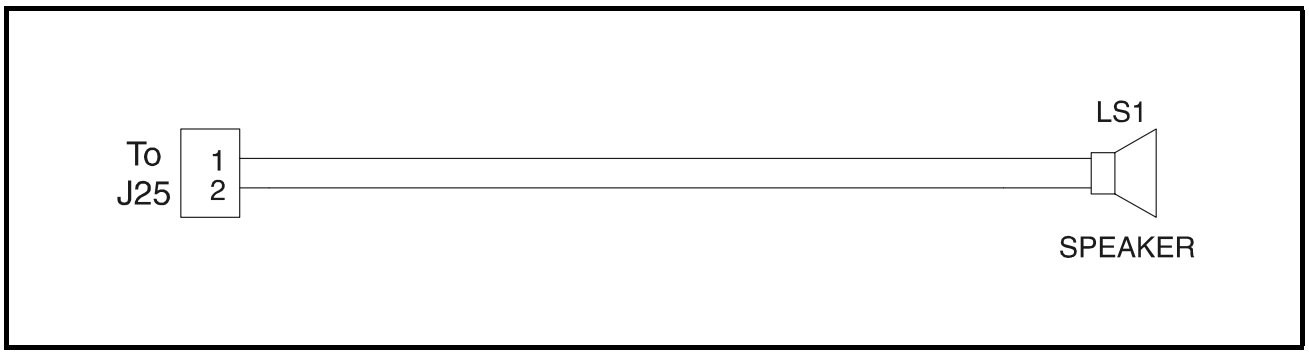


Figure 9-11. Main Speaker Harness (B089140012)

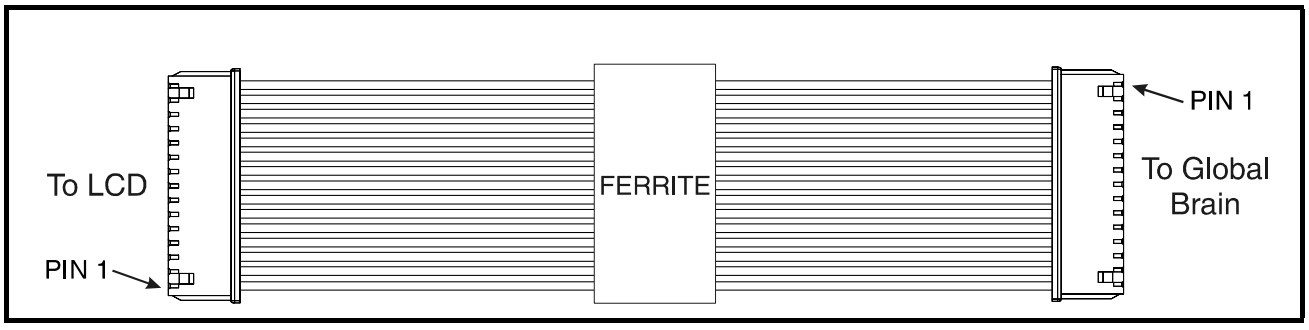


Figure 9-12. LCD Display Harness (B089140002)

Flex Circuits

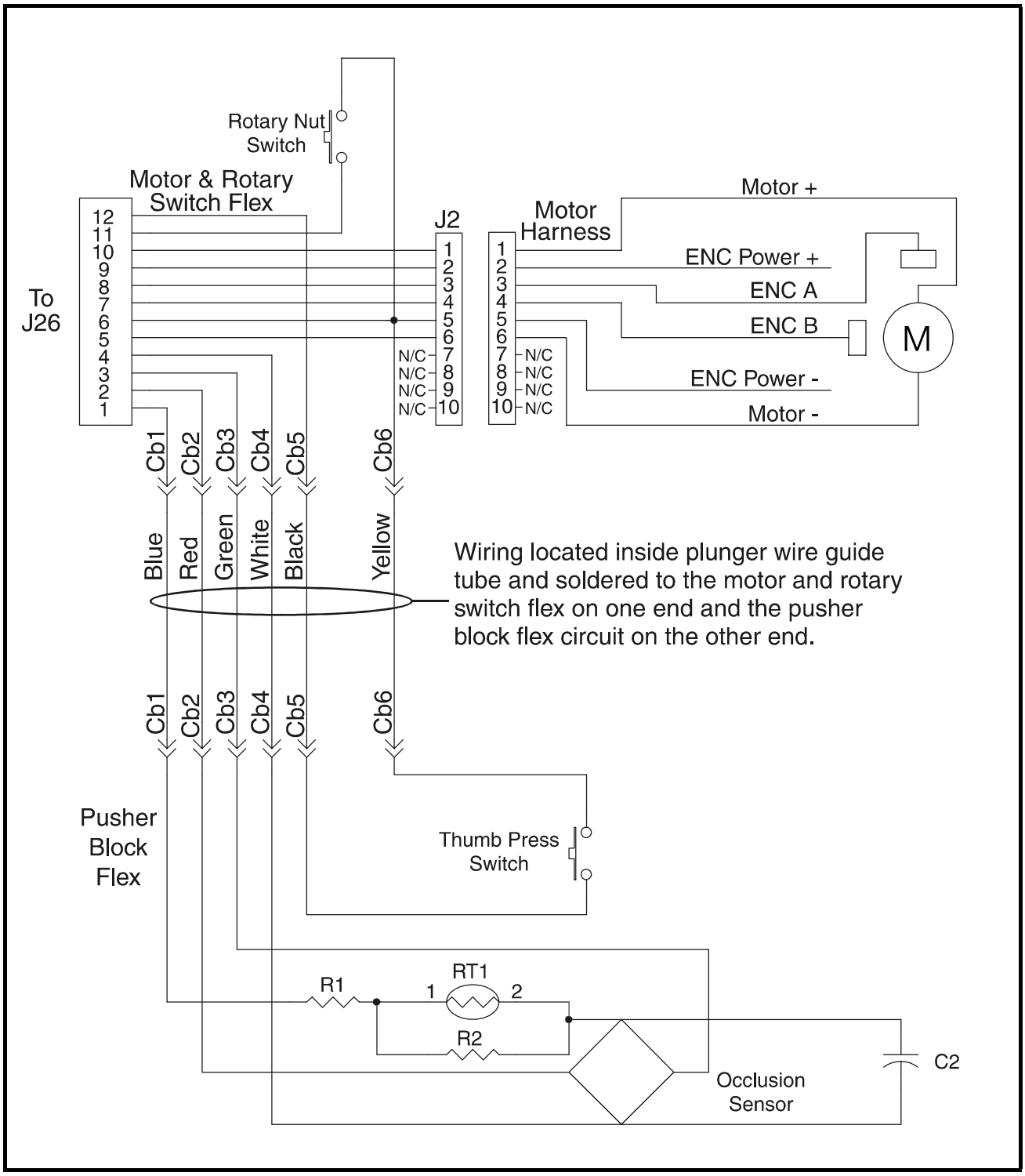


Figure 9-13. Motor & Rotary Switch Flex Circuit (B089140007), Pusher Block Flex Circuit (B089140013), and Motor Harness (5009460000)

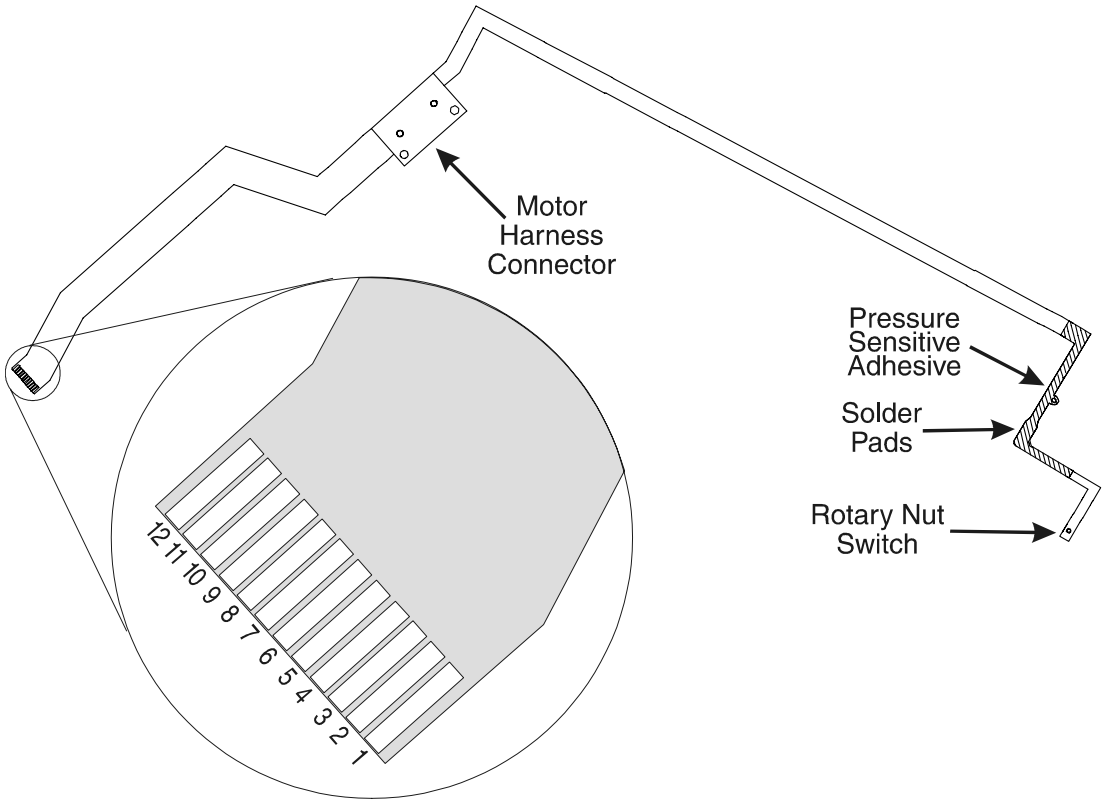


Figure 9-14. Motor & Rotary Switch Flex (B089140007)

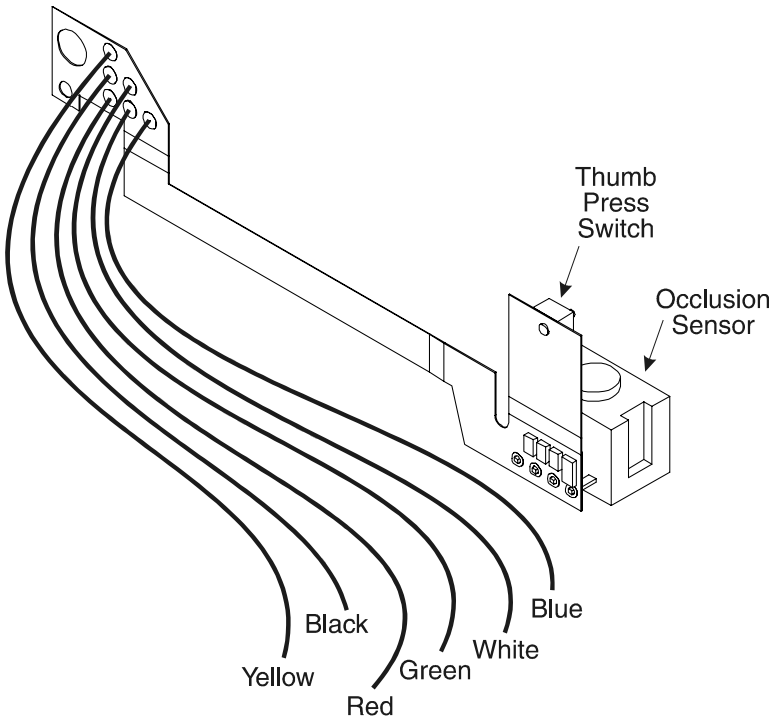
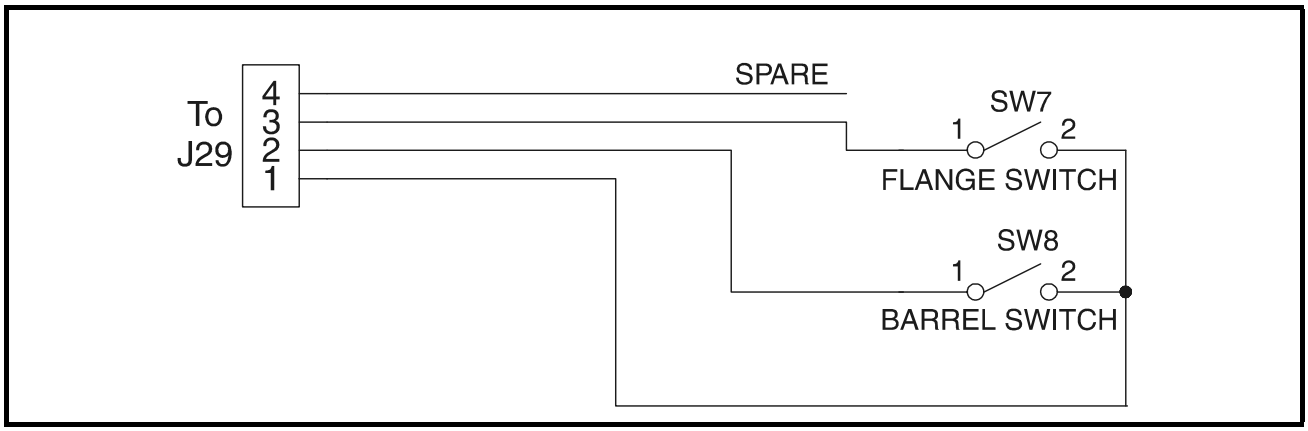


Figure 9-15. Pusher Block Flex (B089140013)



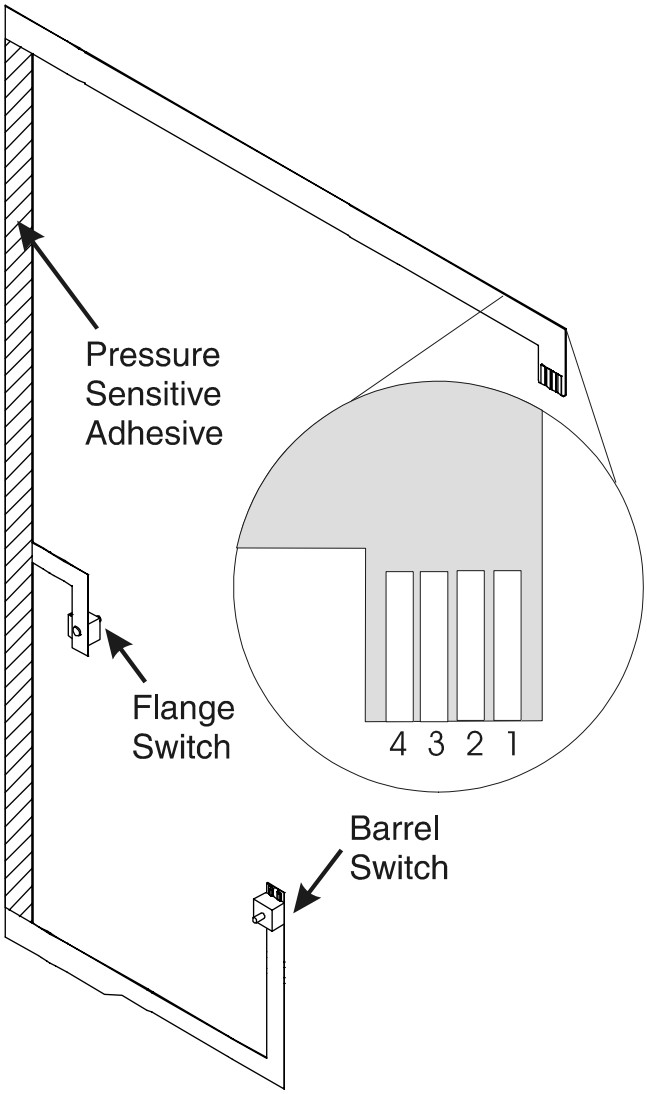
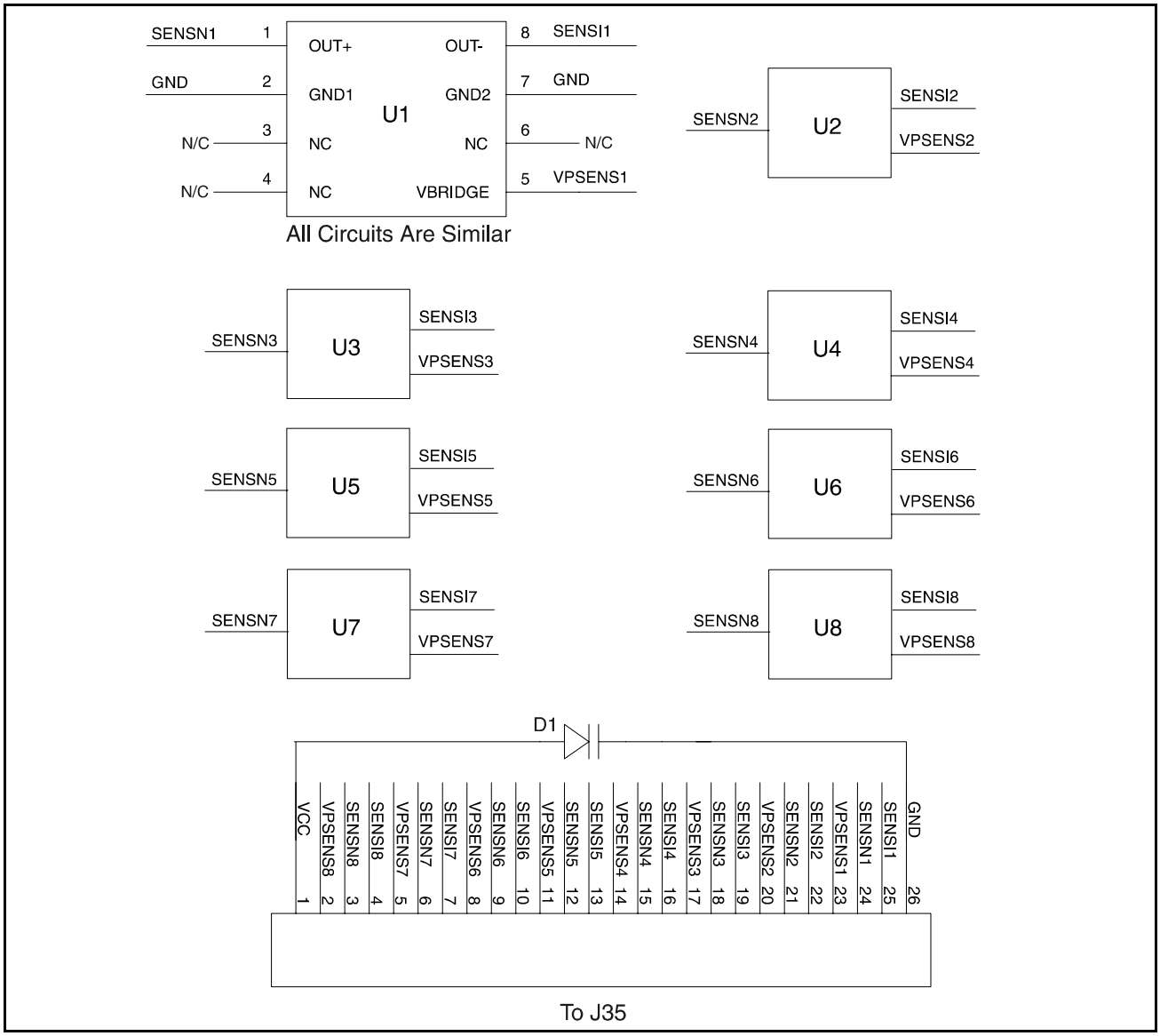


Figure 9-16. Flange & Barrel Switch Flex (B089140005)



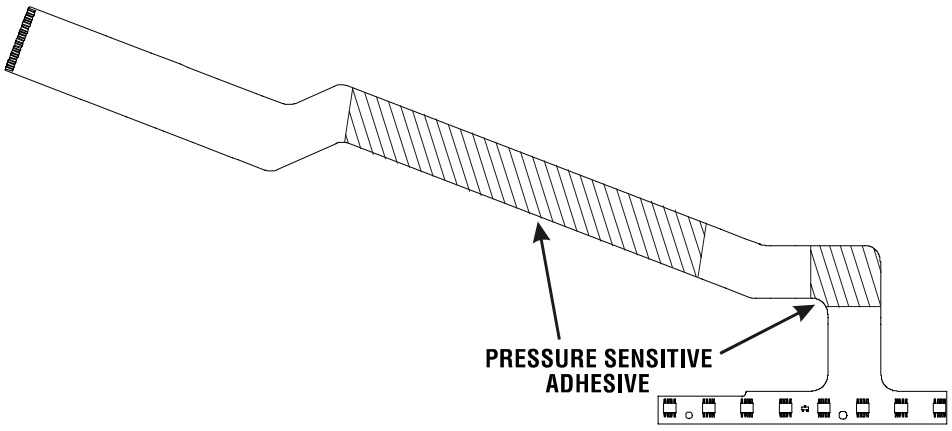
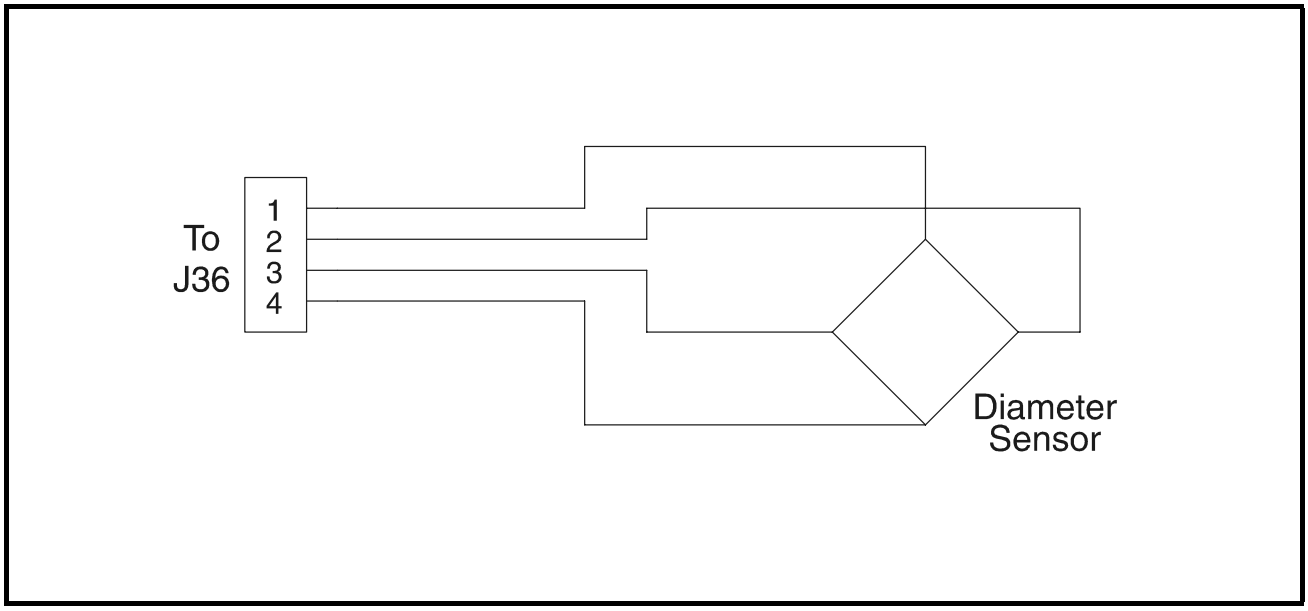


Figure 9-17. Linear Position Sensor Flex (B089140008)



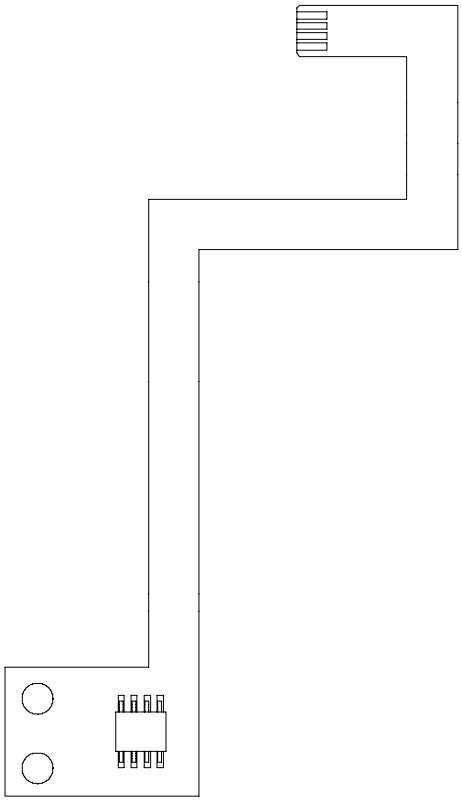


Figure 9-18. Syringe Diameter Sensor Flex (B089140006)

10 - Repair Parts

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Overview

This chapter identifies all replaceable parts for the pump. It contains parts lists and associated illustrations of the parts or subassemblies available for pump repair.

NOTE: Not all parts used in the pump are available as individual replacement items.

The figures show exploded views of major assemblies. The numbered callouts correspond to item numbers in the parts list adjacent to each figure.

For technical assistance, parts ordering, or service and repair information for this product, call 1-800-THE-PUMP.

Parts Lists & Exploded View Drawings

See all the following pages in this section.

Syringe Door Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089120009RP	ASSEMBLY, SYRINGE DOOR (Includes all parts shown below)	
1	B089120021RP	ASSEMBLY, SYRINGE DOOR WITH HINGE	1
2	B089390002	LOCK, SYRINGE DOOR	1
3	4009330124	WASHER, 3/4 INT. LOCK	1
4	4009320107	NUT, 3/4-24 HEX	1
5	B089120013RP	ASSEMBLY, DOOR LATCH WITH MAGNET	1
6	B089452000	DOOR MAGNET	1
7	4009330126	WASHER, 9/32 INT. TOOTH	1
8	4009320106	NUT, 9/32-28 HEX	1
9	0726A0598	LABEL, FLANGE LOCATION	1

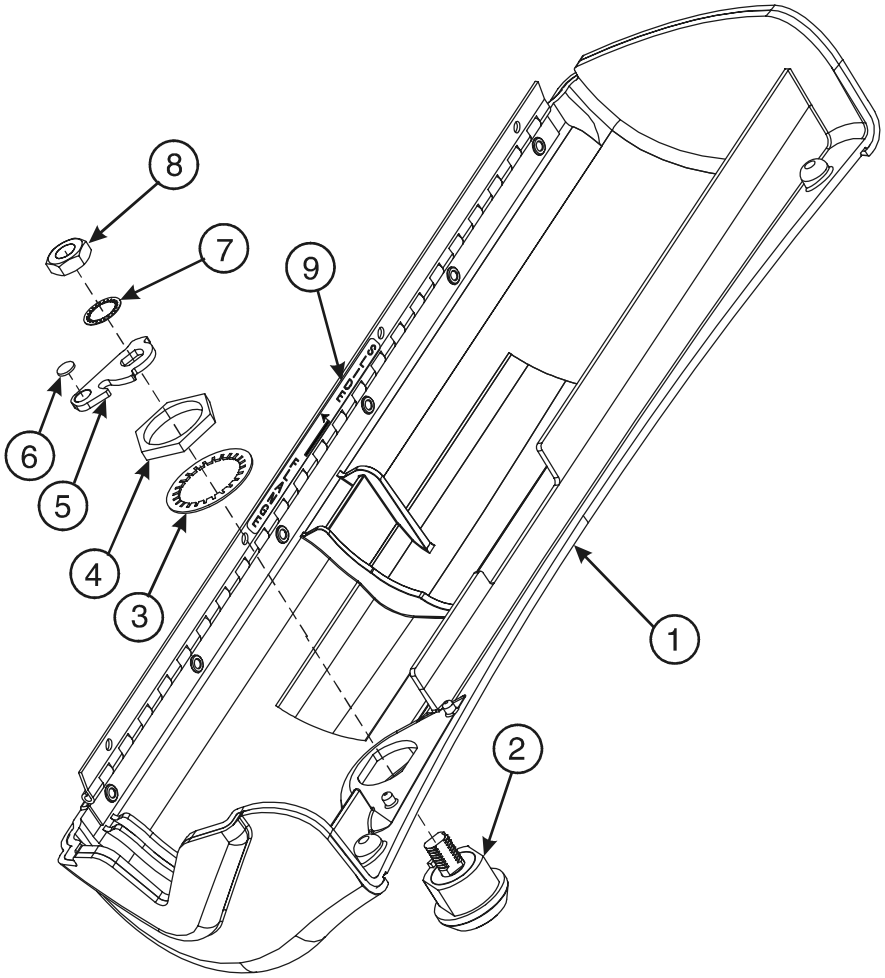


Figure 10-1. Syringe Door Assembly

Front & Rear Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
1	B089120015RP	ASSEMBLY, D-CELL PACK - See Figure 10-14	1
2	4009310202	SCREW, M3 x 14 PH TORX	11
3	Not Available	ASSEMBLY, REAR (For Illustration Only) - See Figure 10-8	1
4	B089910000	ASSEMBLY, GASKET KIT	1
5	B089690003	PAD, SMALL SCREW CAP	2
6	B089690004	PAD, LARGE SCREW CAP	3
7	Not Available	ASSEMBLY, FRONT (For Illustration Only) - See Figure 10-3	1
8	4009310203	SCREW, M3 x 20 PH TORX SS	1
9	B089120009RP	ASSEMBLY, SYRINGE DOOR - See Figure 10-1	1

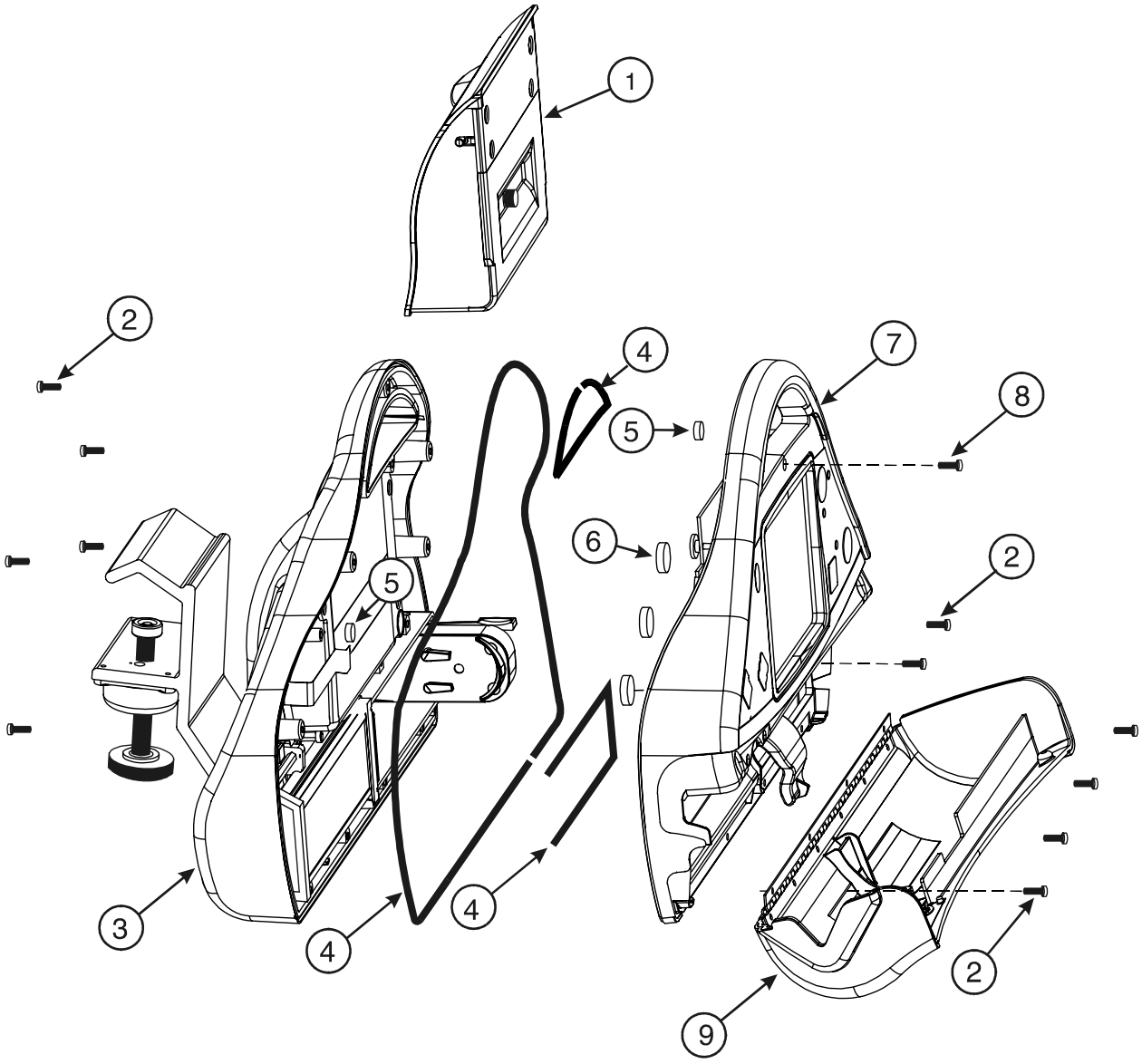


Figure 10-2. Front & Rear Assembly

Front Housing Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
1	B089180000RP	ASSEMBLY, LCD BOARD STACK - See Figure 10-6	1
2	B089610002	PAD, LCD BOARD STACK GLOVE	1
3	4009310205	SCREW, DELTA PT M2.2 X 6M PAN SEMS	5
4	B089140016	HARNESS, BACKUP BUZZER	1
5	F069630007	GASKET, BUZZER	1
6	B089140012	HARNESS, MAIN SPEAKER	1
7	F069630006	GASKET, SPEAKER	1
8	B089140010	HARNESS, DOOR SENSOR	1
9	4009310185	SCREW, M3 X 6 BH HEX SS	2
10	B089130008RP	BOARD, IRDA	1
11	B089140021	HARNESS, IRDA	1
12	B089140017	HARNESS, BACKLIGHT INVERTER	1
13	B089130007RP	BOARD, BACKLIGHT INVERTER	1
14	Not Available	ASSEMBLY, FRONT W/O LCD/BOARD (For Illustration Only) - See Figure 10-5	1

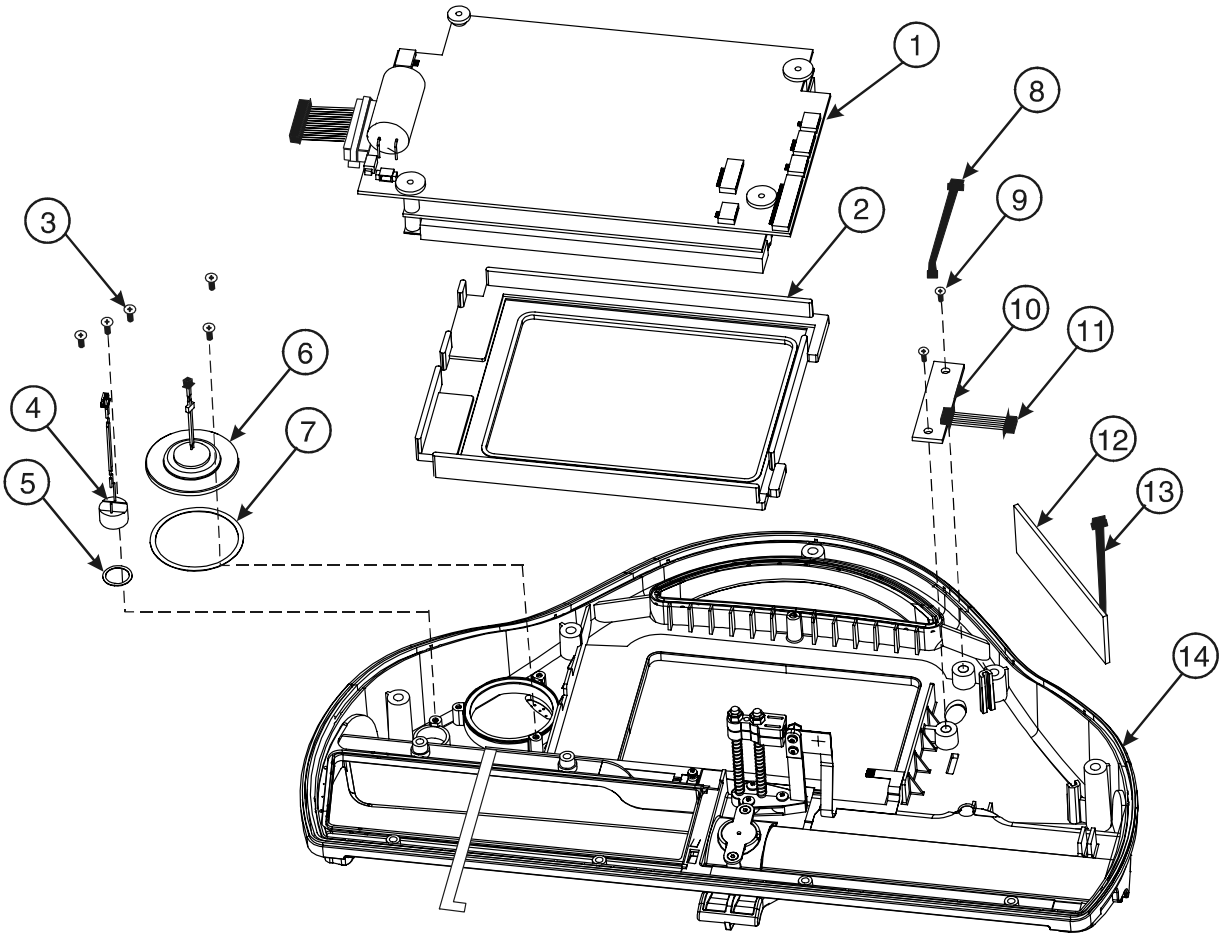


Figure 10-3. Front Housing Assembly

Front Housing with Keypads and Labels			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089120029RP	ASSEMBLY, FRONT W/ KEYPADS (Includes all parts shown below)	
1	B089110000	MEMBRANE, KEYPAD, TOP	1
2	B089110001	MEMBRANE, KEYPAD, BOTTOM	1
3	Not Available	HOUSING, FRONT CASE (For Illustration Only) - See Figure 10-5	1
4	0726X0600	LABEL, LOGO	1
5	0726X5949	LABEL, ON/OFF	1
6	B089474000	MEMBRANE, POWER ON/OFF SWITCH	1

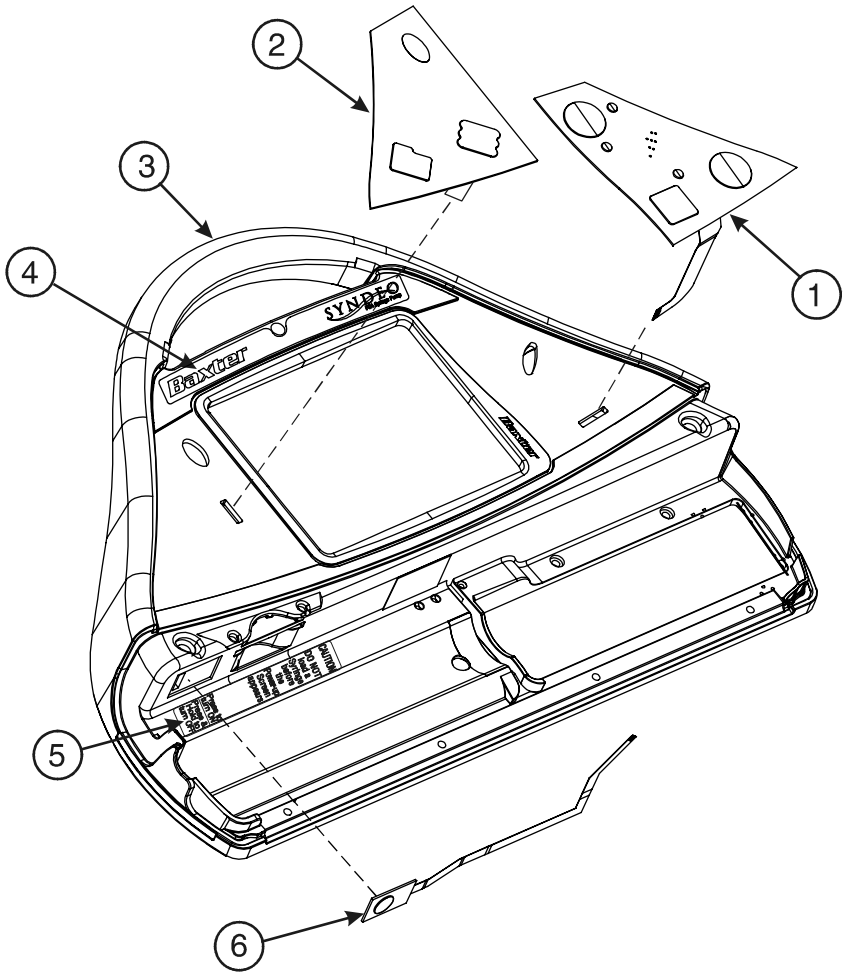


Figure 10-4. Front Housing with Keypads & Labels

Front Housing Assembly w/o Circuit Board Stack			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
1	4009320103	LOCKNUT. M3 NYLON INSERT SS	4
2	B089620036	BARREL CLAMP MAGNET HOLDER	2
3	B089452002	MAGNET, 0.25" DIA X 0.25"	1
4	4009390133	E RET. RING 1/8 DIA	2
5	4009370123	SPRING, BARREL CLAMP	2
6	4009310208	SCREW, # 2 X 1/4 FLT THRD FRMG	3
7	B089620026	BARREL DETECTOR POSITION BLOCK	1
8	B089620038	BARREL SWITCH HOLDER	1
9	B089620025	BARREL DETECTOR BOOT	1
10	4009310185	SCREW, M3 X 6 BH HEX SS	2
11	B089620022	BARREL CLAMP SENSOR BRACKET	1
12	B089140006	FLEX, SYRINGE DIA SENSOR	1
13	B089310002	SCREW, M2.2 X 6 PH TORX DELTA PT	3
14	B089180009RP	ASSEMBLY, FLANGE DETECTOR - See Figure 10-15	1
15	B089120029RP	ASSEMBLY, FRONT W/ KEYPADS - See Figure 10-4	1
16	B089120028RP	ASSEMBLY, BARREL CLAMP	1

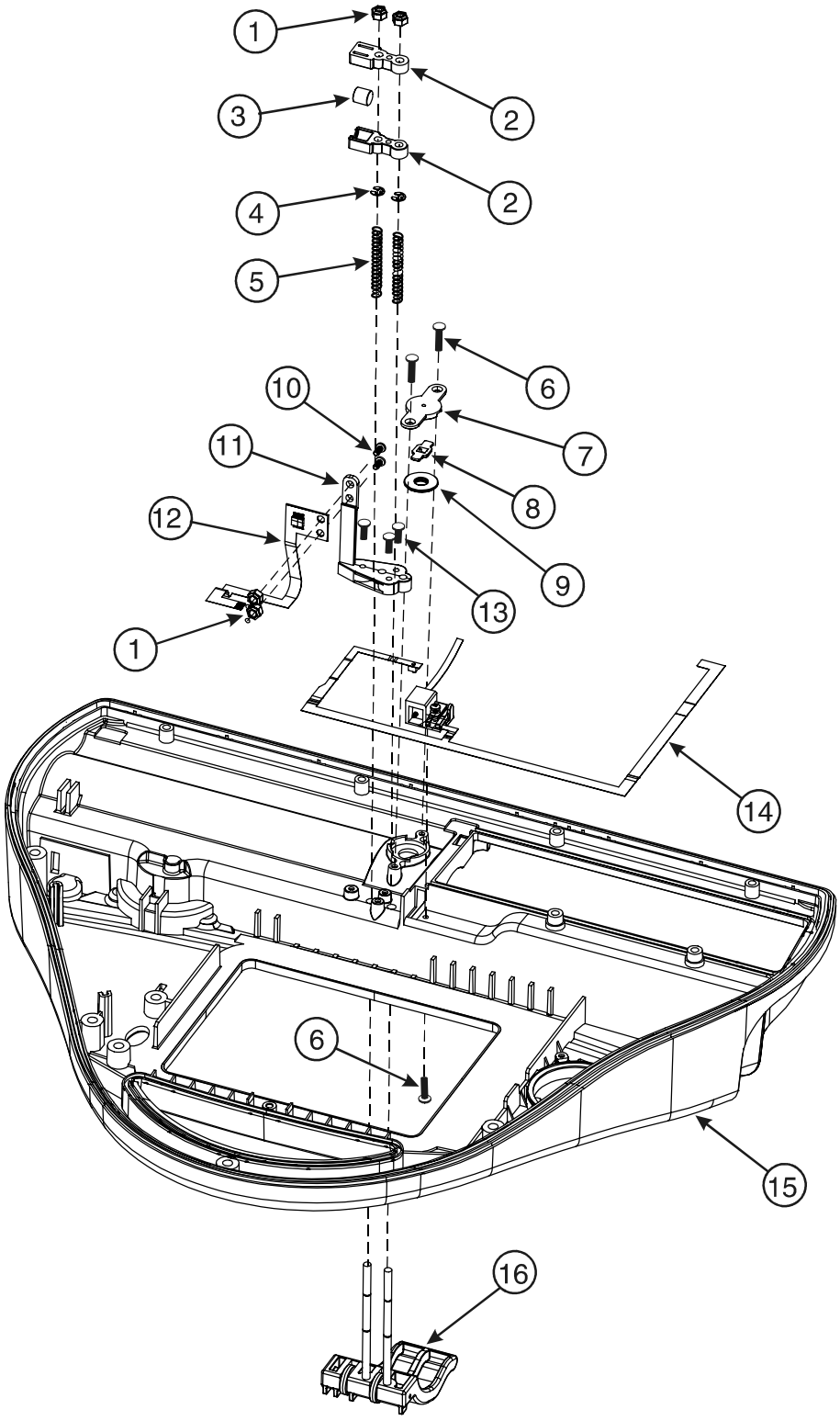


Figure 10-5. Front Housing Assembly w/o Circuit Board Stack

Circuit Board Stack Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089180000RP	ASSEMBLY, LCD/BOARD STACK (Includes all parts shown below)	
1	4009310157	SCREW M3 X 25 M PH, SS	4
	B089180012RP	ASSEMBLY, TOUCHSCREEN & LCD DISPLAY WITH BACKLIGHT (Includes Item #2 and Item #3)	
2	B089494000	TOUCHSCREEN ONLY	1
3	5009494102	LCD WITH BACKLIGHT	1
	5009492007	BACKLIGHT ONLY (Not Shown)	
4	B089140002	HARNESS, LCD DISPLAY	1
5	B089620047	STANDOFF, PLASTIC 9MM HIGH	8
6	B089130003RP	BOARD, GLOBAL BRAIN W/ BATTERY	1
	5009480104	LITHIUM BATTERY ONLY (Not shown)	
7	B089130006RP	BOARD, INTERFACE	1
8	B089620024	SCREW CAP, SMALL STACK	1
9	B089620028	SCREW CAP, LARGE STACK	3
	3009090109	TIE WRAP 5 1/2" X 1/8" THICK (Not Shown)	1
	5950009043	TAPE, DOUBLE-SIDED 3M 4032 1/32 X 3/4 (Not Shown)	1

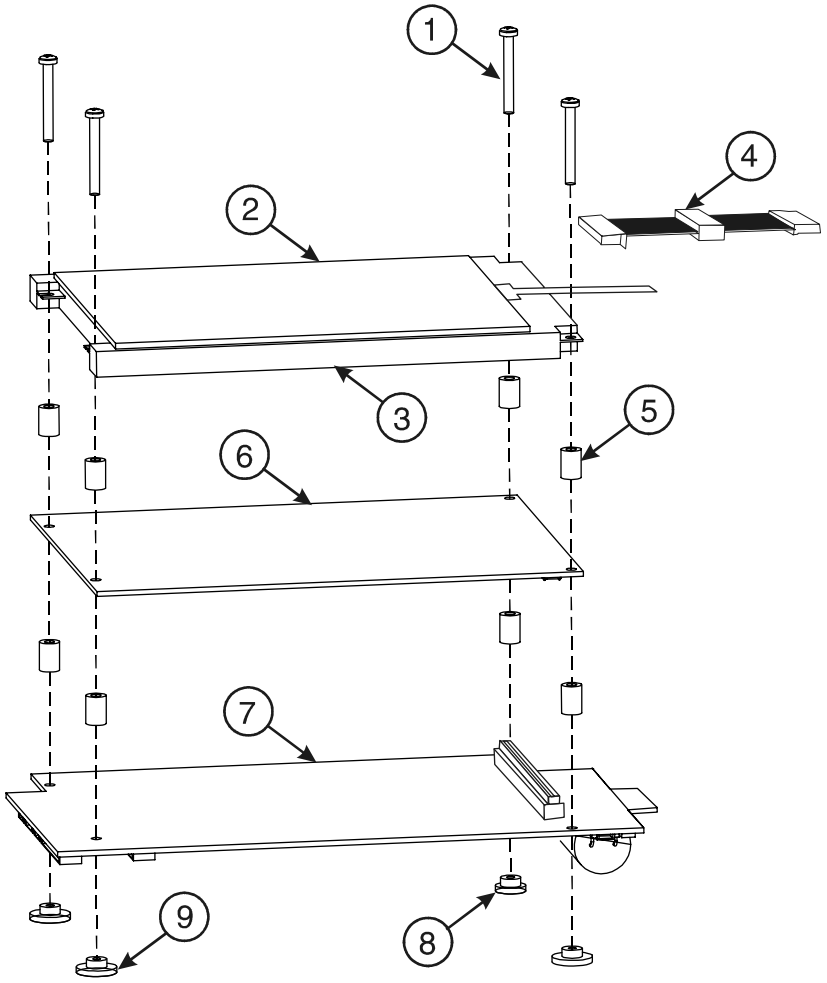


Figure 10-6. Circuit Board Stack Assembly

Rear Housing with Labels			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089120027RP	ASSEMBLY, REAR WITH LABELS (Includes all parts shown below)	
1	0726X8568	LABEL, OPERATING INSTRUCTIONS	1
2	0726X6485	LABEL, SIGNATURE/RATINGS	1
3	Not Available	LABEL, SERIAL NUMBER (For Illustration Only)	1
4	Not Available	OVERLAY, LABEL, SERIAL NUMBER (For Illustration Only)	1
5	0726X8566	LABEL, PATENT	1
6	B069810007	LABEL, SERVICE CONFIGURATION	1
7	Not Available	LABEL, COMPLIANCE (For Illustration Only)	1
8	0726X9743	LABEL, REGULATORY	1

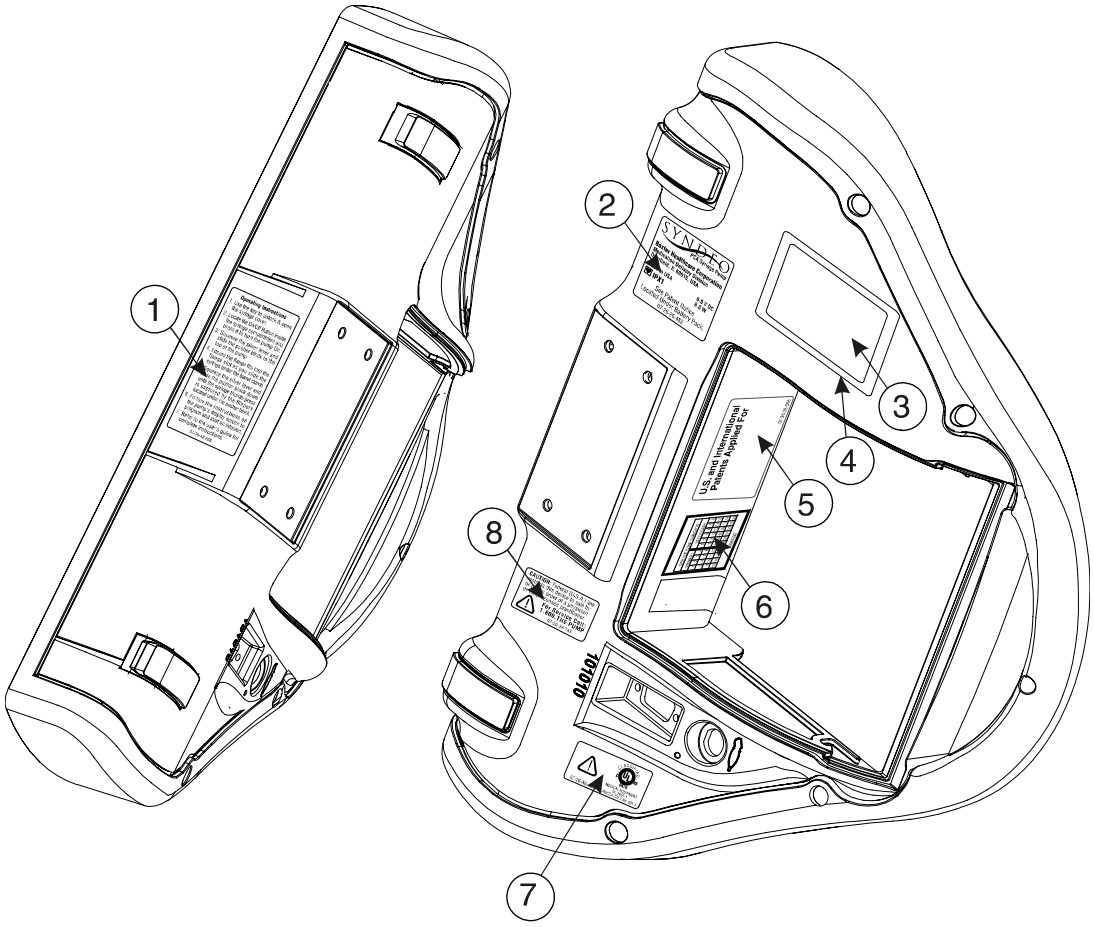


Figure 10-7. Rear Housing with Labels

Rear Housing Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
1	B089120019RP	ASSEMBLY, DRIVE MECH - See Figure 10-9	1
2	4009310202	SCREW, M3 X 0.5 X 14 PH TORX	5
3	Not Available	ASSEMBLY, PLUNGER HOOD (For Illustration Only) - See Figure 10-12	1
4	B089310003	SCREW, DELTA PT 3 X 8 MM BH TORX	3
5	B089620032	BRACKET, STACK STAND (LEFT)	1
6	B089140022	HARNESS, RS232 FERRITE RING	1
7	B089140020	HARNESS, PCA FERRITE RING	1
8	4009320105	NUT, PCA CONNECTOR	1
9	4009330121	WASHER, PCA CONNECTOR	1
10	4009310199	SCREW, M3 X 6 BH HEX	2
11	5009430124	FERRITE	1
12	B089620046	BRACKET, PCA HARNESS FERRITE	1
13	4009310192	SCREW, M2.5 X 10 SCK CAP SS	2
14	4009330127	WASHER, M2.5 X 0.5 X 6 SS FLAT	2
15	B089620044	BRACKET, RS232 HARNESS FERRITE	1
16	B089620033	BRACKET, STACK STAND (RIGHT)	1
17	B089310002	SCREW, DELTA PT 2.2 X 6 TORX	2
18	B089624009	CLAMP, PUMP BATTERY BOARD CONNECTOR	1
19	B089110003RP	ASSEMBLY, POWER BOARD HARNESS	1
20	4009310166	SCREW, M4 X 12 BH HEX SS	4
21	B089232002	PLATE, INTERNAL POLE CLAMP	1
22	B089120027RP	ASSEMBLY, REAR W/ LABELS - See Figure 10-7	1
23	B089140011	HARNESS, PCA PANEL CONNECTOR	1
24	B089630006	GASKET, RS232 CONNECTOR	1
25	B089140009	HARNESS, RS232	1
26	4009390001	RS232 PORT COVER W/ TETHER	1
27	4009310205	SCREW M2.2 X 6 DELTA PT SS	1
28	4009232005	D-SUB MOUNTING BRACKET	2
29	B089120008RP	ASSEMBLY, POLE CLAMP BRACKET - See Figure 10-13	1
	3009090109	TIE WRAP 5 1/2" X 1/8" THICK (Not Shown)	2

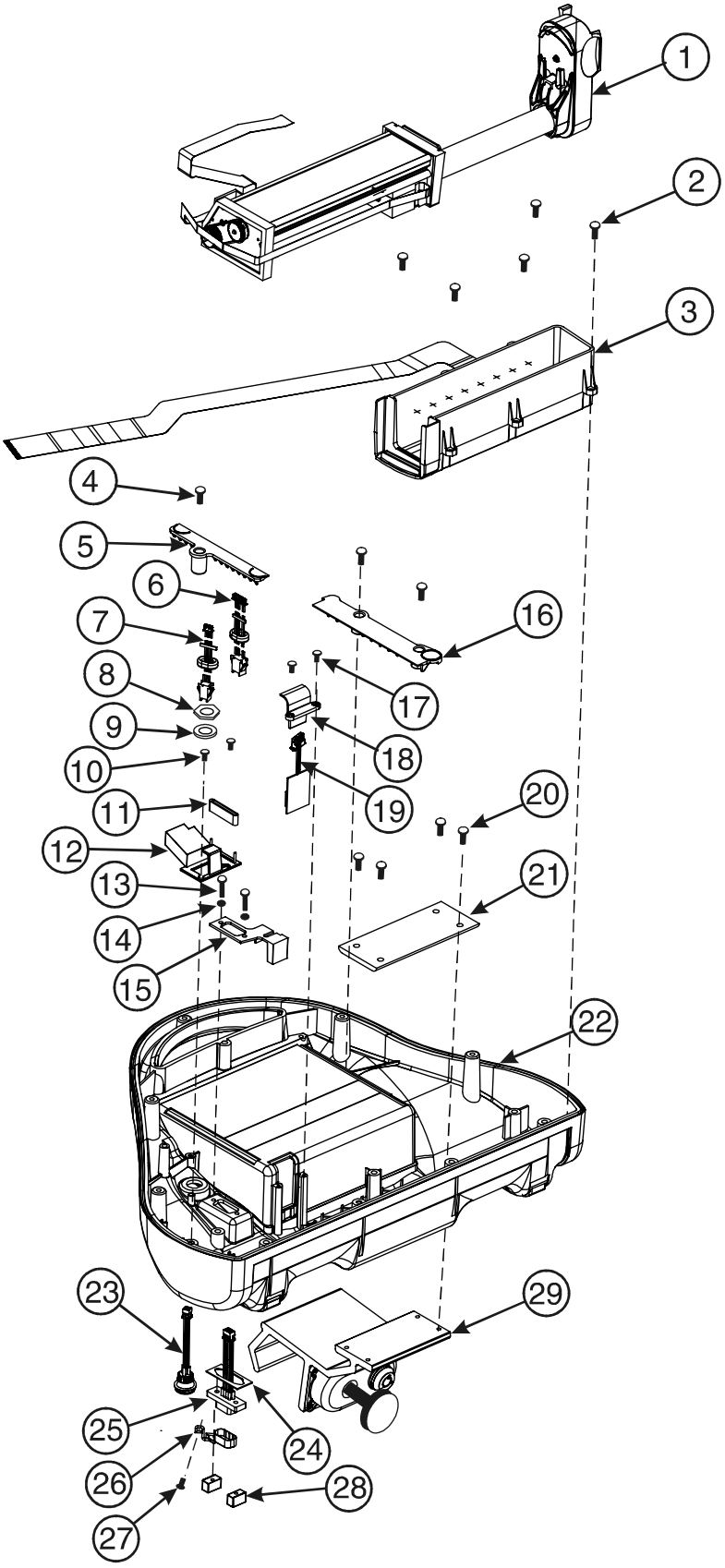


Figure 10-8. Rear Housing Assembly

Drive Mechanism Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089120019RP	ASSEMBLY, DRIVE MECH (Includes all parts shown below)	
1	B089180007RP	ASSEMBLY, PLUNGER HEAD & OUTER TUBE - See Figure 10-11	1
2	B089120004RP	ASSEMBLY, ROTARY NUT ACTUATOR	1
3	4009370122	SPRING, ACTUATOR RETURN	1
4	B089624010	PAD, TOP DRIVE MECH. BLOCK	1
5	4009310155	SCREW, M2.5 X 12 SCH HEX SS	8
6	4009310165	SCREW, M2 X 5 PAN HD PH SS	2
7	B089620016	OUTER TUBE BUSHING	1
8	B089120017RP	ASSEMBLY, TOP DRIVE MECH. BLOCK W/PINS	1
9	4009380105	BEARING, 4.7 ID X 12.7 OD	2
10	4009315111	DOWEL PIN, 5 X 24 mm CRFD SS	1
11	B089120035RP	ASSEMBLY, SLIDE WITH ROTARY NUT & FLEX	1
12	B089230003	DRIVE SCREW	1
13	Not Available	ASSEMBLY, MOTOR MOUNT (For Illustration Only) - See Figure 10-10	1
14	4009330118	PRELOAD WASHER	1
15	B089230011	SPROCKET WITH CLIP SLOT	2
16	4009310204	SET SCREW, M3 X 5 CUP PT SS	2
17	4009390125	BELT 57	1
18	4009390129	RETAINING RING, 19/32 SFT EXT ZINC	1
19	B089624011	PAD, BOTTOM DRIVE MECH. BLOCK	1
20	B089241000	RAIL	1

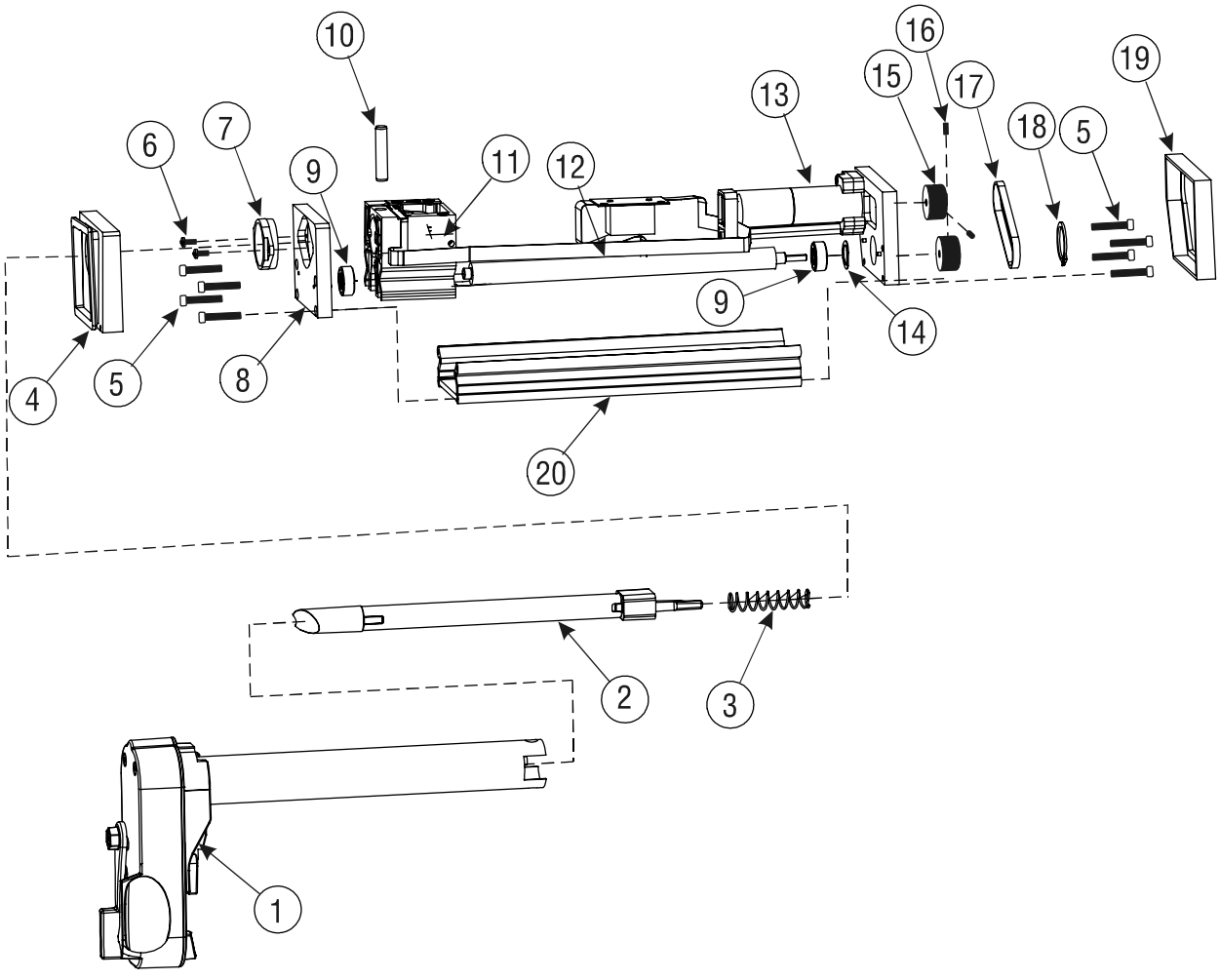


Figure 10-9. Drive Mechanism Assembly

Motor Mount Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
1	4009310155	SCREW, M2.5 X 12 HEX SCH SS	2
2	4009330127	WASHER, M2.5 x 0.5 x 6	3
3	B089622000	MOTOR BACK PLATE	1
4	B089690003	PAD, SMALL SCREW CAP	1
5	5009460000	MOTOR W/GEARBOX & ENCODER	1
6	B089230024	MOTOR MOUNT STANDOFF	1
7	B089622001	MOTOR MOUNT	1
8	B089120018RP	ASSEMBLY, BOTTOM DRIVE MECH BLOCK W/PINS	1
9	4009310209	SCREW, # 2-56 X 1/4 FLHD PHL	2

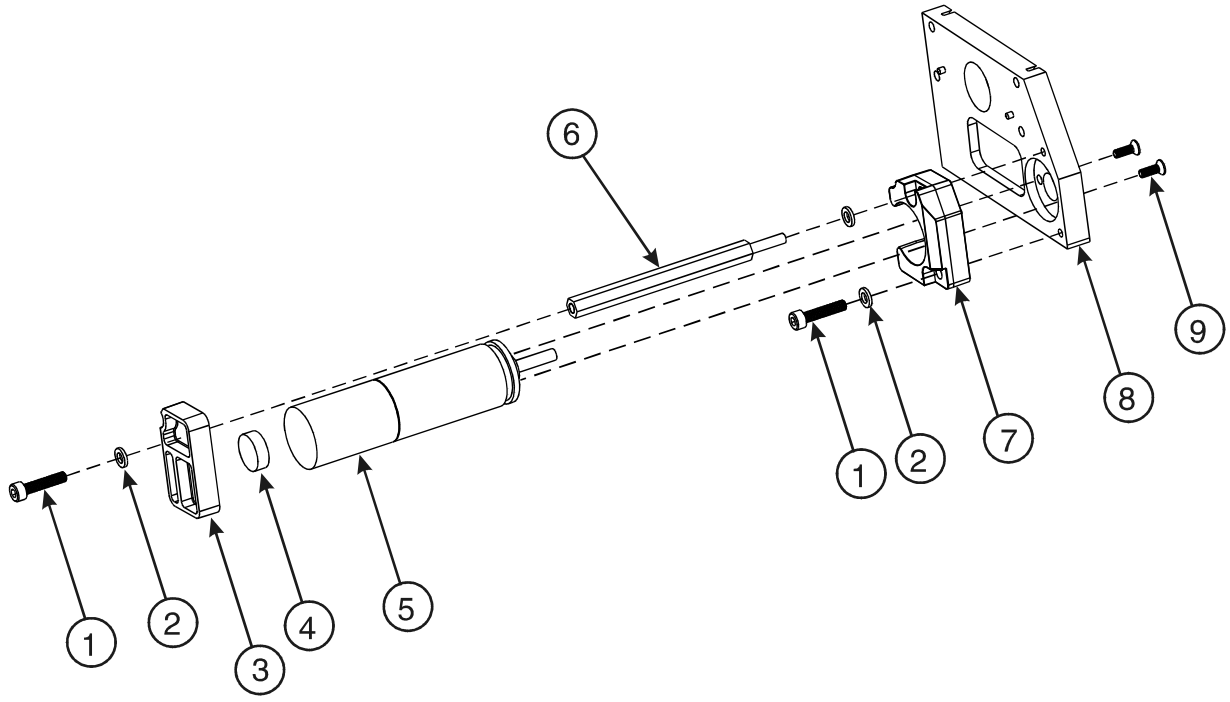


Figure 10-10. Motor Mount Assembly

Plunger Head & Outer Tube Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089180007RP	ASSEMBLY, PLUNGER HEAD & OUTER TUBE (Includes all parts shown below)	
1	4009310201	SCREW, M2.5 X 12 FH TORX	8
2	0726X0599	LABEL, SQUEEZE FULLY	1
3	B089120026RP	ASSEMBLY, PLUNGER COVER (Includes plunger lever, plunger actuator & rollers, magnet, and mounting screw)	1
4	B089620014	BRACKET, PLUNGER FLEX CLIP	1
5	B089140013	FLEX, PLUNGER	1
6	B089120025RP	ASSEMBLY, LOAD BEAM W/ PIN & BOOT	1
7	4009315112	DOWEL PIN, 1.5 X 16 MM CFRD SS	1
8	B089620010	FLIPPER LOOP LINK	1
9	B089620006	HOUSING, PLUNGER HEAD	1
10	B089620041	PLUNGER, VISOR PLASTIC	1
11	B089370006	SPRING, FLIPPER	1
12	B089620011	FLIPPER POST LINK	1
13	4009310176	SET SCREW, M1.6 X 5 MM SS	2
14	4009310193	SCREW, M3 X 8 FLAT CSK TORX	2
15	B089620009	FLIPPER 2	1
16	B089620008	FLIPPER 1	1
17	B089230017	WIRE GUIDE TUBE	1
18	B089120003RP	OUTER TUBE W/ NUB RING	1

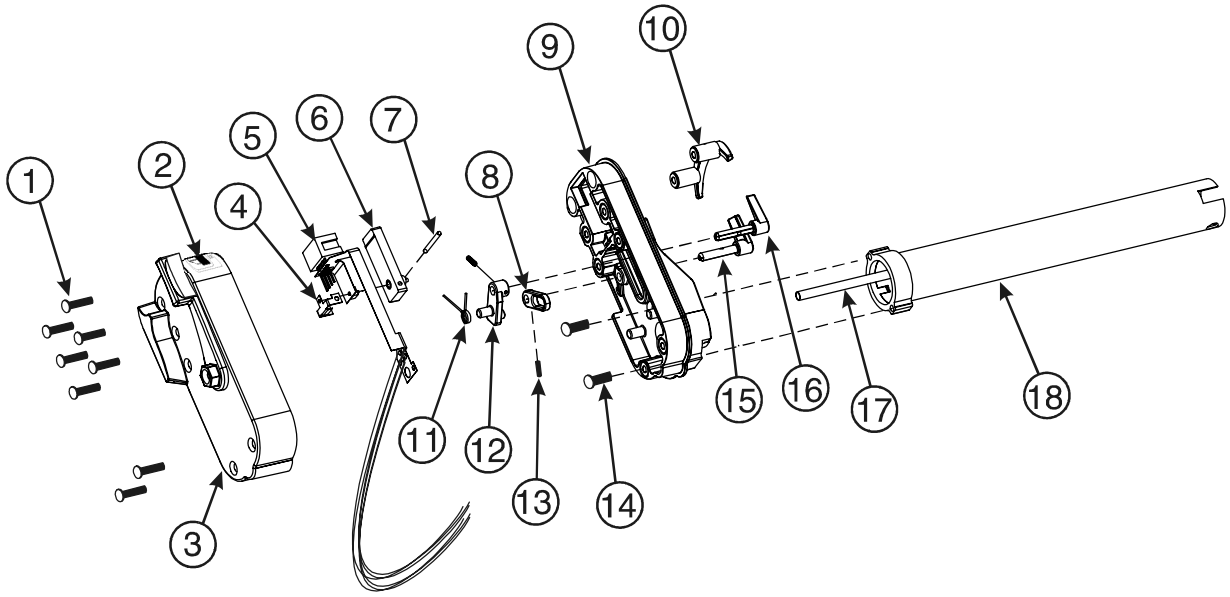


Figure 10-11. Plunger Head & Outer Tube Assembly

Plunger Hood Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
1	4009310202	SCREW, M3 X 0.5 X 14 PH TORX	2
2	B089624001	HOUSING, PLUNGER HOOD	1
3	B089140008	FLEX, LINEAR POSITION SENSOR	1

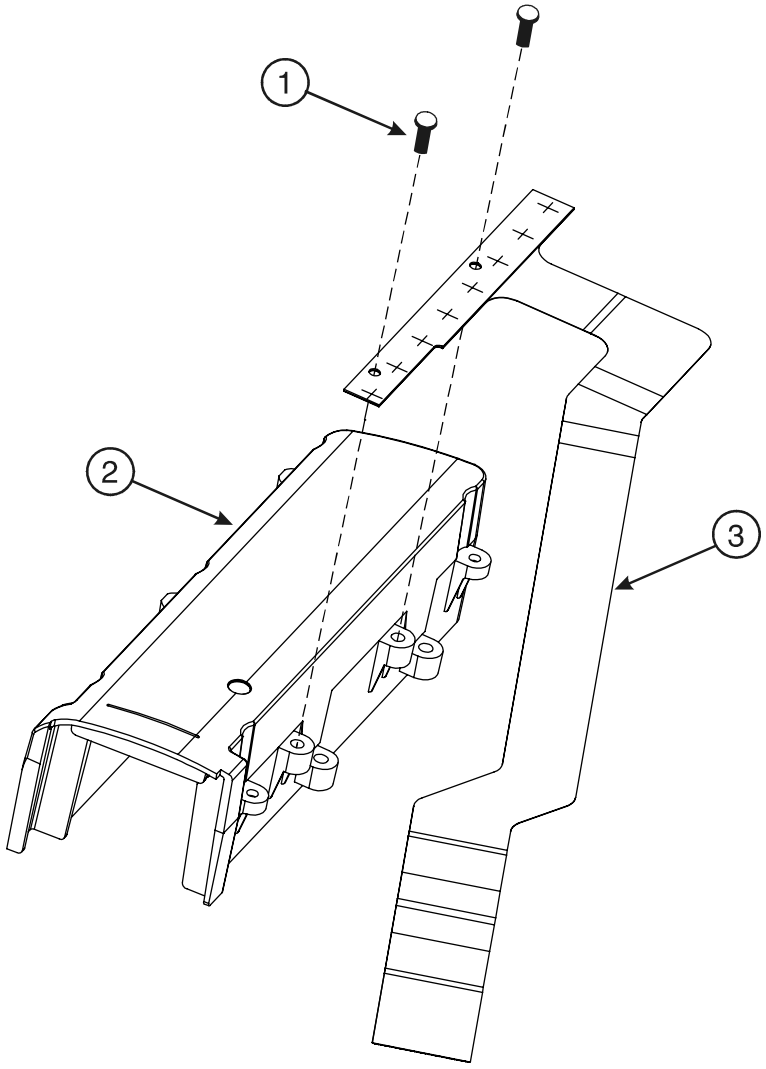


Figure 10-12. Plunger Hood Assembly

Pole Clamp Bracket Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089120008RP	ASSEMBLY, POLE CLAMP BRACKET (Includes all parts shown below)	
1	B089310000	SCREW KNOB	1
2	B089390000	LOCK, 7-PIN	1
3	4009310197	SCREW, 4-40 TAMPER RESISTANT	4
4	0726X5913	LABEL, POLE CLAMP LOCK	1
5	B089620017	HOUSING, POLE CLAMP COVER	1
6	4009330124	WASHER, 3/4 INTERNAL LOCK	1
7	4009320107	NUT, 3/4-24 HEX UNS-28 THREAD	1
8	B089232004	CAM STOP	1
9	B089230015	GEAR, SPUR 32P 1/8 FACE LOCK	1
10	4009320106	NUT, 9/32-28 HEX	1
11	B089230014	GEAR, SPUR 32P 1/4 FACE KNOB	1
12	4009310188	SCREW, 1/4-28 X 1/4 HEX	1
13	4009330125	WASHER, FLAT 1/4 LIGHT	1
14	B089370007	SPRING, CLUTCH (POLE CLAMP LOCK)	1
15	0726X6487	LABEL, WARNING	1
16	B089241001RP	MOUNT, POLE CLAMP	1
17	4009390135	TRUARC RETAINING RING, 5/16"	1
18	B089230013	TIP PAD	1
19	4009390134	TRUARC RETAINING CLIP, 3/16"	1

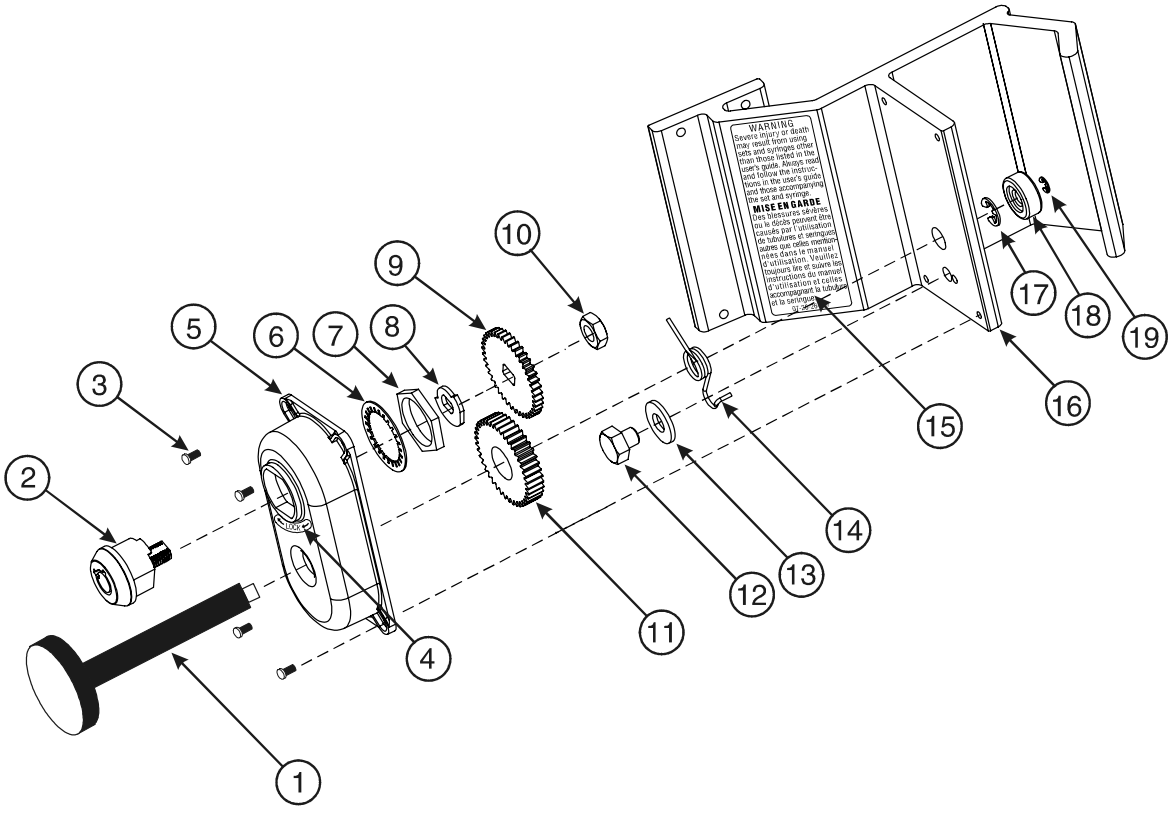


Figure 10-13. Pole Clamp Bracket Assembly

D-Cell Battery Pack Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089120015RP	ASSEMBLY, D-CELL PACK (Includes all parts shown below)	
1	B089120023RP	ASSEMBLY, KNURLED KNOB	1
2	B089120031RP	D-CELL CASE DOOR WITH KNURLED KNOB	1
3	B089310003	SCREW, DELTA POINT M3 X 8 mm TORX	6
4	B089624013	HOUSING, D-CELL PACK BOTTOM	1
5	0726X8567	LABEL, CHANGE BATTERIES	1
6	B089370003	SPRING, BATTERY PACK LATCH	2
7	B089624007	BATTERY PACK LATCH	1
8	B089230020	STANDOFF, BATTERY PACK	1
9	B089140019RP	ASSEMBLY, D-CELL BATTERY HOLDER HARNESS (Includes Item #10 and Item #13)	1
10	0726X8569	LABEL, BATTERY INSTALLATION	2
11	4009320103	LOCKNUT, M3 NYLON INSERT	1
12	B089690006	PAD, D-CELL PACK FOAM	1
13	B089130005RP	CIRCUIT BOARD, D-CELL PACK	1
14	B089120032RP	ASSEMBLY, TOP, D-CELL PACK (Includes Item #15)	1
15	0726X5911	LABEL, D-CELL BATTERY PACK	1

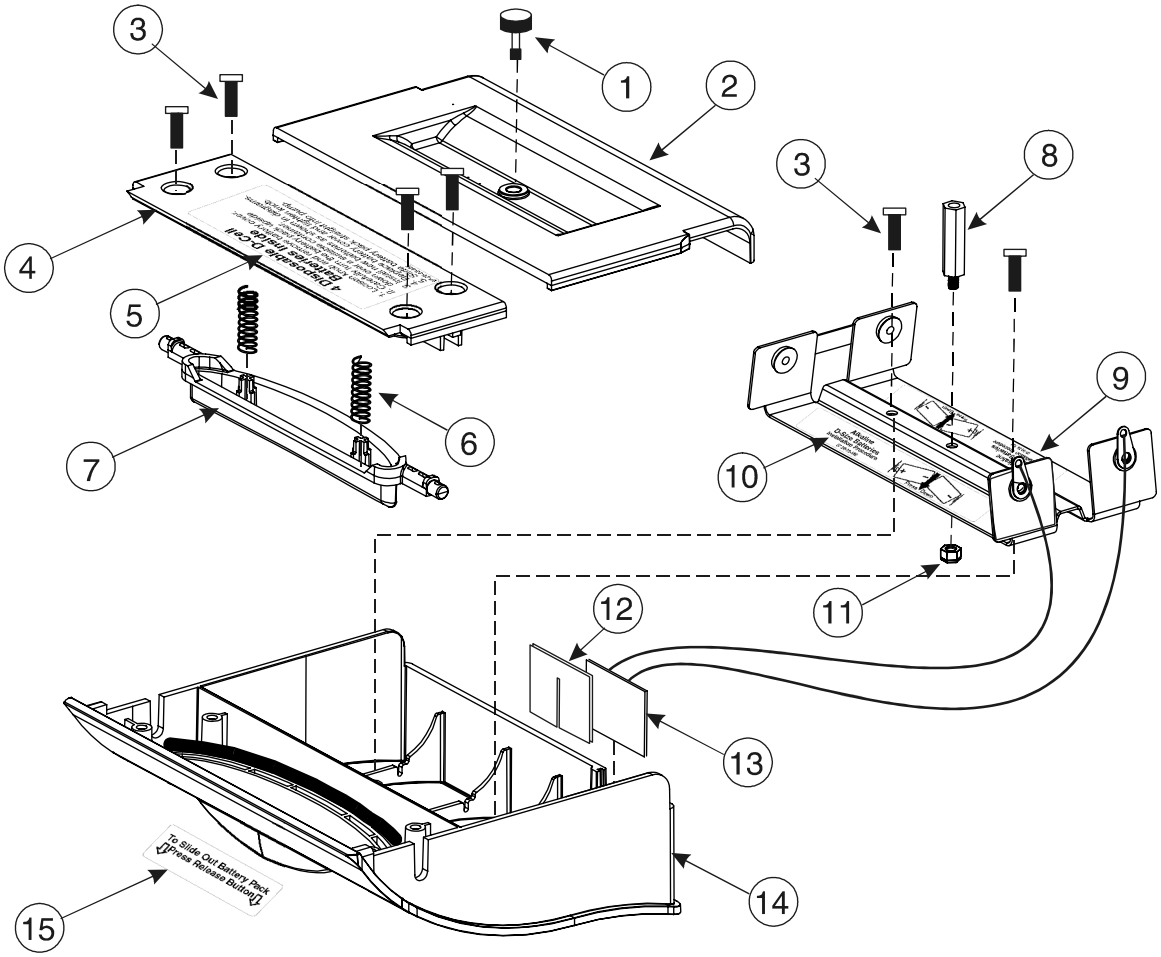


Figure 10-14. D-Cell Battery Pack Assembly

Flange Detector Assembly			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
	B089180009RP	ASSEMBLY, FLANGE DETECTOR (Includes all parts shown below)	
1	B089620043	HOLDER, MICRO SWITCH	1
2	4009310211	SCREW, M2.5 X 8 SLOTTED SET FP SS	1
3	B089620019	FLANGE DETECTOR BASE	1
4	4009310184	SET SCREW, M2 X 5 HEX SS	1
5	B089620018	FLANGE DETECTOR SHAFT	1
6	B089620020	FLANGE DETECTOR BAR WITH OVERMOLD	1
7	4009310196	SCREW, M2.2 X 4 DELTA PT TORX	1
8	B089140005	FLEX, FLANGE & BARREL SWITCH	1

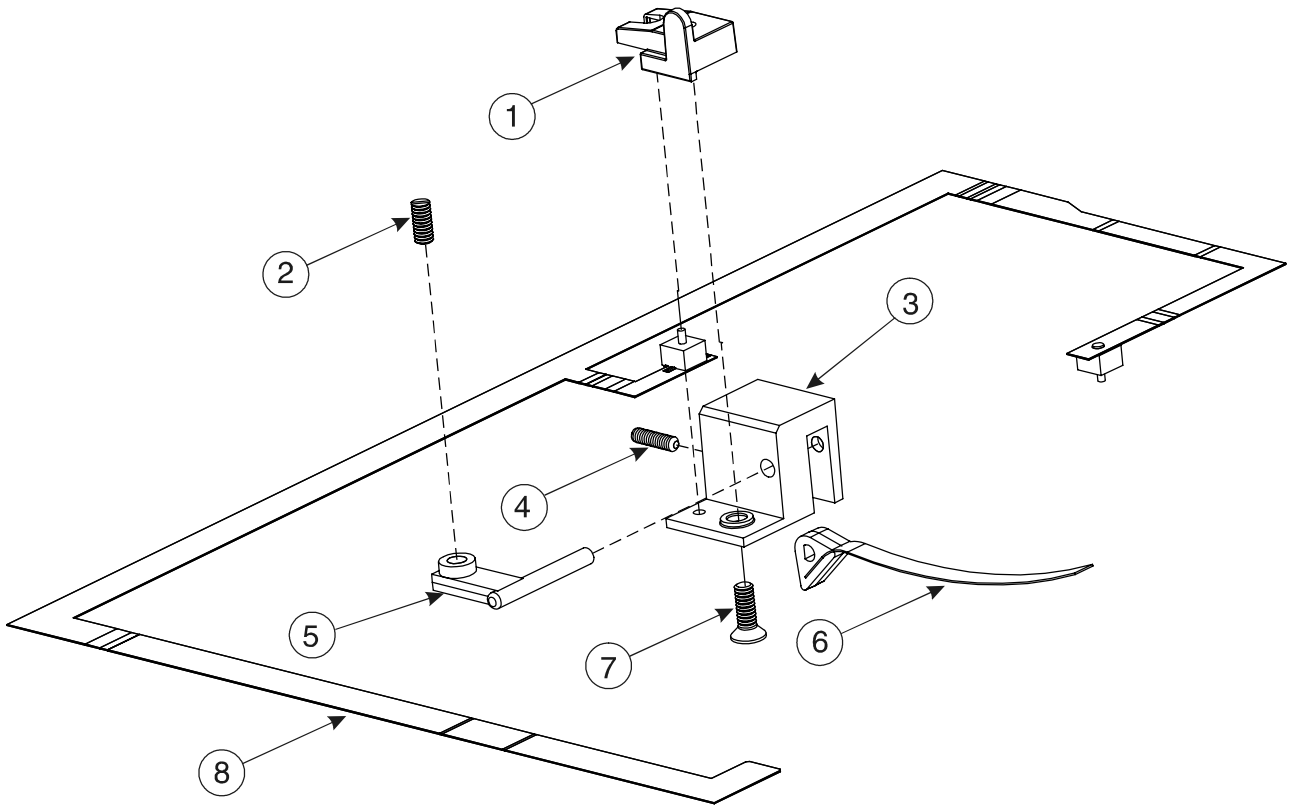


Figure 10-15. Flange Detector Assembly

Accessories			
ITEM #	**PART #**	**DESCRIPTION**	**QUANTITY**
1	B089120024RP	ASSEMBLY, PCA BUTTON (Not Shown) (Includes Item #2 & Item #3)	1
2	B089390001	PATIENT BUTTON CLIP (Not Shown)	1
3	F069090001	CORD WRAP (Not Shown)	1
4	B089690001	KEY, MOLDED TUBULAR, SYNDEO (Not Shown)	1
5	B089710000RP	SYNDEO PACKAGING (Not Shown)	1
6	0719X6933	USER'S GUIDE	1
7	0719X6935	TECHNICAL SPECIFICATIONS GUIDE	1
8	0719X8700	CONFIGURATION GUIDE	1
9	0719X1548	ADDENDUM, USER'S GUIDE	1
10	0719X9342	DIRECTION SHEET, RECOMMENDED CLEANING PRODUCTS	1

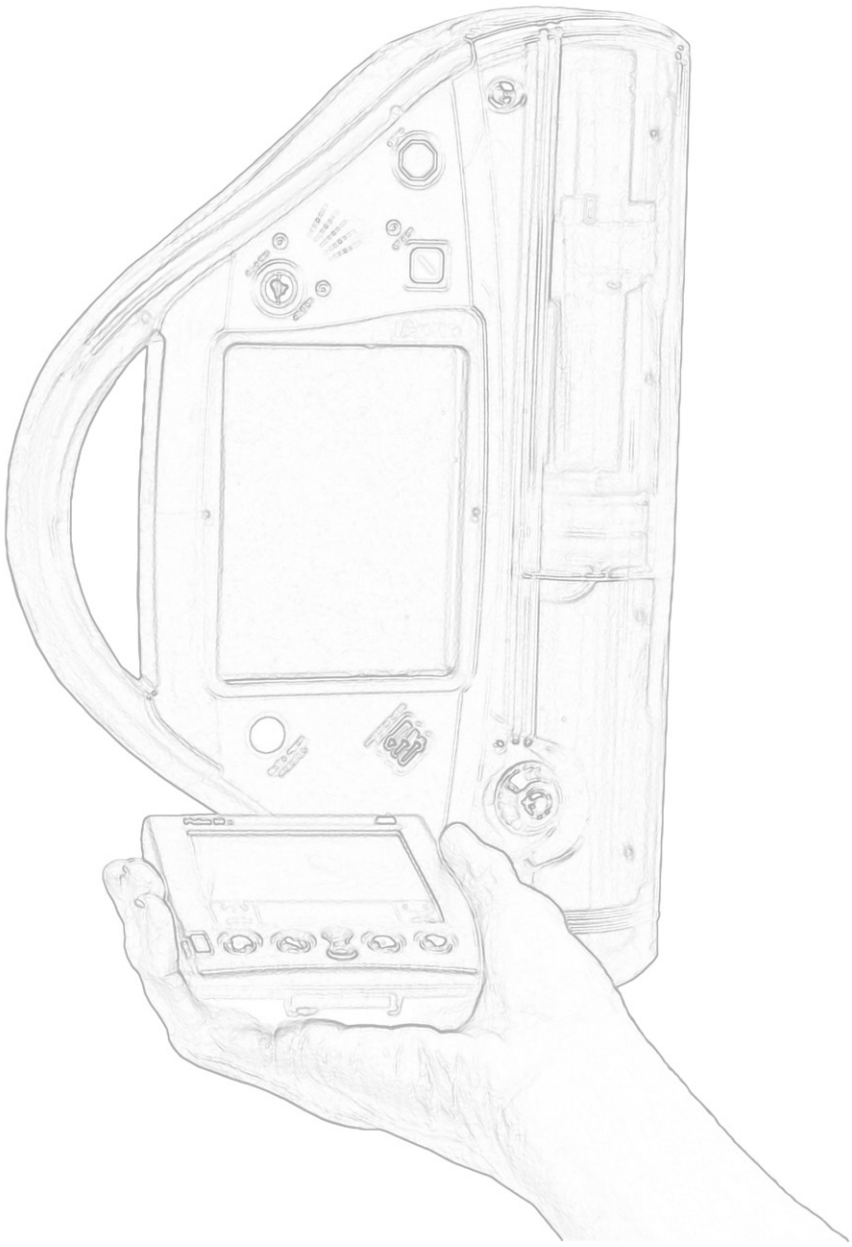
11 - Product Updates

In this section **Page**

Overview 11-1

Overview

This section is included as a location for Service Bulletins and other information pertinent to the maintenance of the pump.



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